The Journal of

Applied Psychology

VOL. VII. DECEMBER, 1923. No. 4

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PUBLISHED BY THE EDITORS
INDIANA UNIVERSITY PRESS
Bloomington, Indiana

Entered as second class matter November 21, 1922 at the post office at Bloomington, Indiana, under the act of March 3, 1879.
Acceptance for mailing at special rate of postage provided for in section 1103, act of October 3, 1917. Authorized December 21, 1923.

The Journal of Applied Psychology

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Communications, manuscripts, reviews, summaries, notices, books and off-prints for review should be addressed to Dr. James P. Porter, Ohio University, Athens, Ohio. Contributors are requested to follow the conventional method of citation employed by this JOURNAL; in every case the year, volume and pages should be specified.

THE JOURNAL OF APPLIED PSYCHOLOGY is published quarterly. The subscription price is $4.00 a year. Single numbers $1.25. Remittances and business communications should be addressed to the Editors, James P. Porter, Ohio University, Athens, Ohio or to William F. Book, Indiana University, Bloomington, Indiana.

THE
JOURNAL OF APPLIED PSYCHOLOGY
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EXPERIMENTS ON ROD-DIVINING

By William S. Foster
University of Minnesota

Some months ago the pastor of a church in a neighboring town, a man about 70 years of age, called at the Psychological Laboratory of the University of Minnesota and asked that experiments be conducted to measure, and if possible to explain, his apparent powers in locating materials by means of divining-rods.

He gave an account covering 45 years of successful location, not only of water but of oil, natural gas, iron, gold and silver in Wisconsin, Minnesota, West Virginia and Texas, and he presented documentary statements by engineers and others who had witnessed his successes, amply sufficient in amount and respectability to warrant the belief that his powers are typical, and at least as great and as convincing to observers as are those of diviners in general. His utter sincerity was manifest not only by his profession and by his action in seeking scientific test and explanation, but also through the fact that he agreed without reserve that the time and all other conditions of experimentation should be determined by us, and that publication should be allowed, whatever the favorable or unfavorable outcome of results. Further evidence appears in the account below.

The experiments were conducted in and about the Psychological Laboratory during the morning and afternoon of March 26, 1923. The writer was assisted by Professors R. M. Elliott and D. G. Paterson.

TEST 1. DIVINATION OF LOCALITY

The diviner reported previous uniform success in locating hidden coins and watches, and our first experiment is intended to test this ability. "Neutral ground" was discovered in the main laboratory and a large table moved upon it. The table top was then chalked in 14 squares, each 20 x 20 inches. The center of each square was numbered visibly, beginning with numbers 1 and 2 at the left end and continuing with odd numbers on one side and even numbers on the other. The floor directly under the table was marked in squares

exactly to correspond to the top, and the floor and space beneath were shielded from sight by cardboard screens.

The rod used was a piece of fairly stiff piano wire bent in the shape of a small written "e". It was therefore smaller and more flexible and smooth than the Y of sapling often chosen. The "e" shaped loop in the wire was approximately 2 inches long and the ends, which were held between the fingers in a common divining position, were each about 5½ inches in length.

Silver coins, a silver watch and 2 gold watches were placed in a small cardboard box. An experimenter first placed this box upon the floor in the center of a square chosen by the diviner. When the diviner stepped upon the corresponding square of the table top the rod rotated definitely and strongly. When he stood in any other square he perceived not even a tendency to rotation.

A random series of trials was then made. Their order was known only to the experimenter who did the placing. Before each trial this experimenter left the room. The diviner was then brought in by a second experimenter, mounted the table, and walked slowly over the squares until the rod rotated. In each trial he then continued exploring without indication over all the non-critical squares in order, and finally "double checked" his first location. No hesitation was manifested at any time, and often the diviner carried on a conversation as he explored.

The second experimenter recorded the estimates, which always fell in the center of some square. Thirty-two trials were made, the box being placed twice in the center of each of the 14 squares, and at intervals (without the diviner's knowledge of such intention) 4 trials were made in which the box was not placed at all, but removed entirely from the room.

In all of these four latter trials indications were obtained exactly as usual, squares 13, 3, 1 and 5 being designated. In the remaining twenty-eight trials the correct square was indicated once only, whereas two correct judgments are likely to be given by chance alone.

Considering the two "sides" of the table merely (i.e., odd numbered *versus* even numbered squares) the side was correctly indicated in 57% of trials and the wrong side in 43%, whereas 50% of correct judgments are most likely by chance alone. But if we consider the accuracy in judgments of "end" (i.e., first 7 *versus* last 7 squares; and first six plus square No. 3 *versus* first six plus square No. 7) the outcome is more than equally unfavorable; 37% right *versus* 63% wrong.

A consideration of the *amount* of error made in location verifies the judgment that successful locations were rather fewer than

chance would indicate. The average error which would most likely occur by chance is approximately 50 inches. The actual errors average 54 inches. Another fair (but possibly unreliable) method of judging accuracy is by a "pseudo-correlation" between the square-numbers reported and the numbers given. By rank differences the "correlation" so obtained is −.22. A rank-differences correlation which considers merely the seven cross-table oblongs of two squares each comes out −.13.

We must conclude that under such rigidly controlled conditions no power of accurate location whatever is indicated. The assurance and lack of hesitation with which such faulty locations were made by the diviner in the apparently total absence of cues are truly astonishing, but our observation furnished no basis for even a guess at explanation.

TEST 2. DIVINATION OF AMOUNT OF MATERIALS

Neither the diviner nor any experimenter was permitted to know the actual results of the first test, but a second test was begun at once. In preliminary trials (made with knowledge on his part concerning the amounts of material placed in the box) the diviner showed that with no materials, the rod did not move; with only the coins, the rod moved weakly and slowly; with the addition of one watch it moved perceptibly more strongly and faster; with still another watch yet more; and with another watch added, very perceptibly more. He maintained his ability to discriminate with ease between these steps in amount of material present, and agreed to report accordingly in an experiment either "nothing," "weak," "fair," strong," or "very strong."

The diviner stood on a square on the table top. An experimenter sat beneath the table and placed in random order in the box in the center of the corresponding square on the floor either nothing or an indicated amount of material. Twenty-five trials were made; 5 with nothing, and 5 with each of the four positive amounts.

The diviner judged correctly in 24% of cases, 20% being indicated by chance. His average error was 1.4 steps, as compared with the 1.6 steps which chance would indicate. The rank-differences correlation between actual and estimated amounts was $+.20$, P. E. $= \pm.13$, (Pearson coefficient $= +.12$), as compared with the .00 correlation most indicated by chance alone.

It is impossible to say whether these relatively small differences from chance are significant or not. To avoid the fatigue of constant mounting on the table, the diviner did not leave the room between trials, and the possibility exists that differences in the noises made in changing the amounts, in placing the box again on

the floor, in the tone of the experimenter's voice in calling "ready", etc., may have served quite "unintentionally" or "unconsciously" as cues which slightly favored correct judgments.

TEST 3. DIVINATION OF DEPTH

As an indicator of depth, the diviner used a heavy straight wire rod about 20 inches long, fitted with a handle and weighted at the outer end. This rod vibrates vertically a given number of times until it corresponds to the supposed depth of the material in feet below the diviner's ground. The plane of vibration then suddenly shifts to horizontal.

"Neutral ground" was located in the hallway on the second floor of the laboratory. In the lower hall directly beneath, a long step-ladder reaching from floor to ceiling was set up at an angle of approximately 70 degrees. The depths chosen for experiment were the 12 steps of this ladder and a point on the floor at its foot. According to measurements taken after the completion of the experiment the rise per step was approximately 11 inches, and the range of the thirteen depths chosen varied between approximately 1.1 and 11.9 feet.

The experimenter placed the box of materials used in test 1 at various depths in a random order known only to himself. He was never visible to the diviner, but noises made in climbing up and down and in placing the box were faintly audible *via* the stairways to any one in the second floor hallway where the diviner stood. The possibility of such auditory cues might have been avoided by leading the diviner from the hall between trials but time did not permit. The diviner and the second experimenter, who stood by him and recorded his estimates, knew nothing of the actual depth-positions used save that they varied by steps between the two floors.

Twenty-six trials were taken in random order, each of the 13 depth positions being twice used. In each trial the diviner used first the location rod and then the depth-rod described above. He then gave verbal reports. Estimates such as "between 7 and 8 feet" were recorded as 7½ feet.

The estimates ranged between 3 and 15.5 feet. Seventy-seven per cent of trials were over-estimations, the average estimate being 9.5, as compared with a true average of 6.5 feet. The average error of estimate was 4.5 feet (in a range of about 11 feet) and only 12% of the judgments were accurate within 1 ft. The rank-differences correlation between the actual depths and the diviner's estimates was +.29, (P. E. = .11) which even in so

few trials ought perhaps to be regarded as significantly better than chance.

TEST 4. DIVINATION OF DEPTH WITH INTENTIONAL SUGGESTION

About two-thirds of the way up the stairways leading from the first to the second floor hallway mentioned in test 3 are two landings, from which both the step-ladder and the diviner could be seen. In test 4, taken in the afternoon, six spectators were allowed to stand and watch both the placing and the divining. In order clearly to see the experimenter place the box on the upper steps of the ladder, spectators naturally lean forward slightly.

The diviner was told simply that further experiments on depth-estimates were desired to check those of the morning, and that some of our graduate students and instructors who had never seen divining would be interested to observe it. The spectators did not in general know the purpose of the experiment save that a test of divining was being made. They were warned not to talk loudly, nor by smiling when estimates were made to give possible indications of accuracy or inaccuracy. After half of the trials were made the spectators were told privately to try to make their observation of the experimenter's "placings" somewhat less visibly evident by avoiding leaning to see the upper steps of the ladder. All watched with some interest a series of 26 trials, which in all other respects exactly duplicated those of test 3.

The estimates ranged between 2 and 15 feet. Only 58%, instead of the 77% of test 3 were over-estimations. The average estimate was 6.9, as compared with the former average of 9.5, and with the true average of 6.5 feet. The average error of estimate was reduced from 4.5 to 2.3 feet, and the percentage of estimates accurate within 1 foot was raised from 12 to 19. After the twenty-sixth trial, 5 successive additional trials, made as if in continuation of the series, but with the box of materials entirely removed from the hall, resulted in estimates of 2, 14, 3, 7½ and 3 feet.

The fact that after test 3 the diviner had seen the experimenter measure with a yard-stick the total height from floor to floor may partially account for the improvement in the range of his estimates, and for some of the decrease in amount of over-estimation and of errors, though there is no evidence to show that such correction was realized or knowingly made. Such knowledge of absolute distance, however, would not by itself tend to raise a *rank-differences* correlation above that obtained in test 3, since *relative* rank-order (and not absolute accuracy) is here the deter-

mining factor. The correlation, however, was actually raised from +.29 to +.77, and this notable improvement in accuracy of relative depth accordingly appears to be due to cues obtained from the spectator's behavior (unconscious and involuntary movements).

Spectators agree that external observation of the diviner's behavior did not at all indicate that he gave any particular or *intentional* attention to them or their actions. When not conversing he appeared simply to be "entrancedly" attentive to the action of the rod. He himself, with every objective indication of sincerity, maintains that the rod simply "acts of itself", independently of or "almost in spite of" his volition, and he has no theory to account for his apparent and real successes under less strictly controlled conditions in the field.

He was entirely surprised when shown the results of the tests described, and maintains that his experience had led him to believe that his estimates under our conditions would be nearly or quite perfect. When our theory as to cues was propounded after experimentation, he still could not believe that such a theory can be applied completely or adequately to explain his previous successes, and he made no attempt to justify or to explain the results here presented.

TEST 5. THE LOCATION OF WATER-MAINS

In order more nearly to approximate field conditions, the diviner was asked to judge, through indications of location, direction, width and depth, the probable course of water-mains leading to two buildings on the Campus. An experimenter, who knew the true locations, accompanied him and recorded the observations on a rough map. Light snow covered the ground in most places.

The results obtained are difficult to describe without reproducing the map, but our general impression is that, as is usual in such cases, the diviner's judgments while by no means perfectly accurate or complete, were far too accurate to attribute solely to chance. In case of the first building the only probable course indicated was near the true main, which leads 250 feet to a neighboring building, but it was distant about 15 feet at one end and about 50 feet at the other from the true course. The indicated depth of 11 feet is approximately the true depth. A second indicated course of about 100 feet at 30 feet depth was at an angle to a sewer-pipe leading from the rear of the building and opening out of sight about 50 feet down the river-bank.

In the case of the second building an L-shaped course of 80 feet at 10 feet depth, ending at a visible hydrant was indicated exactly over a true main, but a second main leading to the build-

ing was passed over entirely without indications. These out-of-door observations appear typical and in all essential respects similar to numerous observations reported by Barrett[1] and others. Such experiments point to a judgment that under field conditions, where surface signs and cues from the accompanying person are possible, the diviner is usually more accurate than chance would indicate.

SUMMARY

A fair summary of the evidence regarding the accuracy and the explanation for the apparent sucesses of diviners is entirely impossible in short space.[2] In general, however, the evidence appears to the writer to justify the following conclusions:

1. The matter cannot be dismissed by saying that the diviner's successes in the field are simply lucky or chance hits, but they probably far exceed the expectation of chance.

2. Diviners are not in general charlatans, but sincere believers in their powers. They do not in general possess accurate geological knowledge, nor do they in general appear to rely greatly upon *voluntary* observation of contours and other surface signs, such as experience may have taught them might be significant. If such signs are important, as they appear to be in some cases, knowledge of their preception and importance, and knowledge of his own reliance upon them is not in general realized by the diviner.

3. In almost all "field experiments" the diviner has been accompanied by a "checker" or person who possessed knowledge of the true locations, depths, etc., and cues given unconsciously by such persons in their involuntary movements or unguarded speech appear to be a common basis for the diviners indications, even though again the diviner may not, and usually does not, *intentionally* observe such signs or realize their importance.

4. Experiments in which the cues mentioned in 3 and 4 above were rigidly excluded are rare, and their results in general are either inconclusive or actually negative. The experiments in which predictions made by geologists and by diviners disagreed, and where wells were later drilled to ascertain the facts, do not appear crucial, and the results are variously estimated and explained by different investigators.[3] Two previous experiments under conditions somewhat similar to our own test 1 are briefly

[1]See F. A. Barrett, *Proc. Soc. Psychical Research.* Vol. 13, 1897, pp. 2-280. and Vol. 15, 1900, pp. 130-383.

[2]A fairly full bibliography is given in *The Divining Rod A History of Water-Witching*, U. S. Geol. Survey Pamphlet 416, 1917.

[3]See e. g. W. J. Sollas: *Proc. S. P. R.*, 2, 1884, pp. 73-78, and W. F. Barrett, *op. cit.*, Vol. 15, pp. 144-61.

reported or referred to.[4] The results appear quite uniformly negative, since the diviners obtained approximately the percentage of successes which chance would indicate. Differences in humidity and temperature, etc. (together with hyperaesthesia) have been proposed as cues without, it appears, great warrant. In view of the facts that diviners appear more successful and believe more in their ability to locate water than metals, running rather than standing, and shallow rather than deep water; that plumbers commonly listen for leaks and that everyone has noticed the peculiar auditory quality of the moving water current, it is strange that one finds on casual reading no suggestion that *sound* may be an important cue in many cases. I am told that in some countries putting an ear to the ground is a recognized method of locating underground springs or courses. Our own experiments certainly point to its possible and probable significance under certain conditions. The psychologist certainly does not, at any rate until further inexplicable facts appear, need to suppose a special sense nor a special mystical power of "clairvoyance" or "telepathy" to explain water-divining.

5. The movements of the rod appear to the diviner to be automatic, and often not even to be subject to his voluntary control. The form of the rod and the mechanics of its movement are such as to favor the suggestion that it "moves of itself" and sometimes moves in spite of voluntary efforts genuinely made to restrain it.[5] From unbelievers who inwardly vow in advance to hold the rod steady "though an ocean should be flowing beneath their feet," reports are not uncommon that they do not succeed, but that the rod "twists the more, the more they endeavor to restrain it." The various forms given to the rod, the success of some diviners who use no rod at all but go by "impressions" or "shiver", and the facts that only a relatively small percentage of persons are "sensitive", that the indications appear only if the diviner is "set" for them, and other facts too numerous to mention, all indicate that the existence of a psychical automatism and the presence of some suggestion to touch off a recognized response are the only necessary and essential bases for the "indications".[6]

This hypothesis is all the more probable in the light of our

[4] See E. R. Pease: *Proc. S. P. R.*, 2, 1884, pp. 79-94, and W. F. Barrett, *op. cit.*, Vol. 13, p. 176; Vol. 15, p. 360.

[5] See, for example, numerous instances given by W. F. Barrett: *op. cit.*, M. Culpin: *Spiritualism and the New Psychology*, 1920, pp. 34-43.

[6] "Accompanying the involuntary and unconscious muscular contraction which causes the motion of the forked twig or rod, many diviners experience a peculiar *malaise* and some a convulsive spasm. * * * The state of monoideism of the douser creates a condition of partial catalepsy when some suggestion causes the idea to culminate." Barrett: *op. cit.*, Vol. 15, p. 314. See also Vol. 13, pp. 272-277, 245-249; Vol. 15, pp. 130-134, and elsewhere.

knowledge of the part played by hyperaesthesia and "unconscious notice" preceding or during trance, and in hypnotic recall, the determination of dreams, automatic writing and the like, and in the light of our knowledge of the importance of cues and suggestions often given by the knower's unconscious and involuntary actions and accepted by the "sensitive" without clear realization of the fact. To become convinced in the latter regard, one has only to compare the conditions and results of divining with those of mind-reading, muscle-reading, table-turning and of thinking animals like Clever Hans.

A STUDY OF THE APPROPRIATENESS OF TYPE FACES

By A. T. Poffenberger
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And R. B. Franken
New York University

In the search for perfect advertising no factor is considered of too slight importance to deserve careful investigation. The laws of human behavior as discovered by the psychologists have been generally called upon in order to draw away from an individual the control of his behavior and put it into the hands of the advertiser. By far the greatest amount of consideration has been given to the mechanical devices for gaining and holding attention, and for making impressions permanent. The feelings, pleasantly and unpleasantly toned, are coming to be looked upon as forces influencing reactions to advertising sufficiently to deserve study. Freudian psychology, with its well-known doctrine of the suppression of the unpleasant, may have something to do with this spread of interest. However, Hollingworth some years ago showed the bearing of the "obliviscence of the disagreeable" upon advertising, and pointed out that advertisements to be most effective should be pleasantly toned. No labor or expense is spared on the makeup of an advertisement and especially in color and art work in order to make it pleasing. Much of this elaborate use of artistic material is sometimes criticized on the ground of lack of appropriateness, for after all is said, it is the appropriateness of the presentation that determines whether or not the total effect shall be pleasing.

Typography has long been believed to be a source of mildly pleasant or unpleasant feeling tone, according to its character and appropriateness, and this belief has influenced the choice of type in advertising. The accompanying cut (Fig. 1) will illustrate the differences in the type faces used for various kinds of commodities. In the case of "Disston" and "Speed-grits" the type very clearly carries something of the atmosphere of the commodity. In the case of the other names the appropriateness may not be so evident. The belief is fairly general that heavy faced type carry with them the atmosphere or feeling of solidity and strength, and that the thin faced type suggest fineness and delicacy. Figure 2 shows in a striking way the type faces that are supposed to

FIGURE 1.

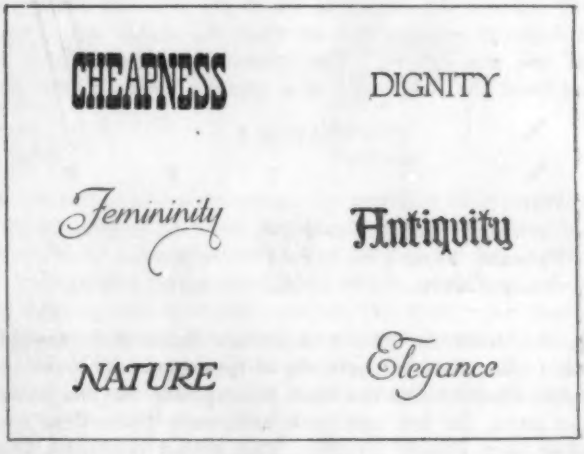

FIGURE 2.

carry the atmosphere of cheapness, dignity, femininity, antiquity, nature, and elegance.

The only published experimental study known to the authors of the appropriateness of type faces is that of Berliner.[1] She measured, by the order of merit method, the relative suitability of eighteen styles of handlettered type for advertising each of four different commodities, namely, fish, pork and beans, pan-cake flour and orange marmalade. Four groups of people were used in the measurements. The coefficients of correlation among the groups for any one commodity will show the degree of agreement among the groups concerning the appropriateness of the type faces for that commodity. The average coefficient of correlation for each of the four articles is given below:

Fish	+.71
Pork and Beans	+.74
Pancake Flour	+.62
Orange Marmalade	+.50

The author interpreted these coefficients as indicating the degree of definiteness of the atmosphere possessed by the commodities, and as the figures show, this definiteness varied somewhat with the commodity.

If now the average orders obtained from any group of subjects for the different commodities are correlated, the size of the coefficients will indicate the degree to which the order of the type varied for the different commodities or what the author called the specificity of the atmosphere. The following figures (Table I) were obtained from the judgments of a group of one hundred people:

TABLE I

		1	2	3	4
1.	Fish	—			
2.	Pork and Beans	+.75	—		
3.	Pancake Flour	+.15	+.20	—	
4.	Orange Marm.	-.32	-.15	+.31	—

Thus, the order for fish and orange marmalade tended to be reversed, (-.32), that is, the style of type that was most appropriate for fish tended to be the least appropriate for marmalade. On the other hand, for fish and pork and beans the orders resembled each other very closely (+.75). The author concludes that commodities might be grouped into classes according to the character of their atmosphere and that type might then be chosen which

[1]Ztsch. f. Angewandte Psychol., Bd. 17, 1920.

would be appropriate for any member of the class.

The experiments to be described in this report differ from those of Berliner in several respects, namely:

1. Instead of hand lettering, the material consisted of twenty-nine of the type faces commonly used for advertising work.
2. Appropriateness of type faces for both abstract qualities and for actual commodities was measured.
3. The judgments of men and women were kept separate in order to show whether sex differences in this form of reaction were present.
4. In only a few cases was the same person asked to judge more than one commodity, and then only after an interval long enough to minimize the effect of the memory of previous arrangements.

A modified form of the order of merit method was employed in this work on account of the large number of specimens to be judged. The type faces each mounted on a separate card were first sorted by each judge into five piles, the first pile containing the most appropriate and the last one containing the least appropriate specimens. The order of the specimens was next determined within each of the five groups. Finally, the specimens in the five groups were put together into a single order. From forty to fifty judgments were obtained in this manner for each of the ten categories given below:

Cheapness	Automobiles
Dignity	Building Material
Economy	Coffee
Luxury	Jewelry
Strength	Perfume

On the following pages are given the samples of type faces used in the experiments with their technical names and also the final rank[1] obtained by each specimen when judged for its appropriateness for each of the categories listed above. Position I indicates the most appropriate specimen, and 29 the least. As there were twenty-nine specimens, the position of any specimen may vary from 1 to 29. The type as illustrated in this report are somewhat smaller than those used in the actual experiment, having been reduced in order to fit the printed page.

[1]The figures represent ranks obtained from men subjects only. As will be demonstrated later, the reactions of the sexes in this study are so similar as to make presentation of both sets of figures unnecessary.

A WHEN, in the course of human events, it becomes necessary $1234&

A—Della Robbia

Cheapness	17	Automobiles	12
Dignity	14	Building Material	16
Economy	5	Coffee	16
Luxury	12	Jewelry	12
Strength	16	Perfume	6

B **WHEN, IN THE COURSE OF HUman events, it becomes necessary for one people to dissolve $12345&**

B—Bodoni Bold

Cheapness	7	Automobiles	6
Dignity	17	Building Material	9
Economy	9	Coffee	10
Luxury	16	Jewelry	20
Strength	9	Perfume	21

C **WHEN, IN THE COURSE OF $12 human events, it becomes 34**

C—John Hancock

Cheapness	2	Automobiles	8.5
Dignity	23	Building Material	3.5
Economy	14	Coffee	2
Luxury	25	Jewelry	25
Strength	3	Perfume	28

D WHEN, IN THE COURSE OF
human events, it becomes $12&

D—Roycroft Tinted

Cheapness	25	Automobiles	22
Dignity	6	Building Material	20
Economy	27	Coffee	18
Luxury	7	Jewelry	7
Strength	19	Perfume	8

E *WHEN, IN THE COURSE OF*
human events, it becomes neces $12

E—New Caslon Italic

Cheapness	15	Automobiles	7
Dignity	12	Building Material	19
Economy	19	Coffee	19
Luxury	11	Jewelry	19
Strength	17	Perfume	10

F WHEN IN THE COURSE OF HUMAN
EVENTS IT BECOMES NEC $1234

F—Blair

Cheapness	21	Automobiles	23
Dignity	7	Building Material	22
Economy	11	Coffee	22
Luxury	10	Jewelry	8
Strength	21	Perfume	11

G WHEN, IN THE COURSE OF human events, it becomes $12345&

G—Caslon Old Style No. 471

Cheapness	13.5	Automobiles	15
Dignity	13	Building Material	15
Economy	6	Coffee	11
Luxury	13	Jewelry	13
Strength	18	Perfume	14

H *WHEN, IN THE COURSE OF human events, it becomes necessary for one people to dissolve the political $1234567&*

H—Caslon Old Style No. 471 Italic

Cheapness	24	Automobiles	17
Dignity	8.5	Building Material	25
Economy	24	Coffee	27
Luxury	6	Jewelry	3.5
Strength	27	Perfume	2

WHEN, IN THE COURSE OF HUMAN events, it becomes necessary for $123

I—New York Gothic

Cheapness	13.5	Automobiles	20
Dignity	15	Building Material	8
Economy	4	Coffee	14
Luxury	17	Jewelry	22
Strength	8	Perfume	22

J WHEN, in the course of human events, it becomes necessary for one people to dissolve the political bands which have con $123456&

J—Century Old Style

Cheapness	11	Automobiles	24
Dignity	22	Building material	25
Economy	2	Coffee	18
Luxury	18	Jewelry	21
Strength	24	Perfume	15

K When, in the course of human $1

K—Old English

Cheapness	22	Automobiles	25
Dignity	4	Building Material	23
Economy	28	Coffee	23
Luxury	4	Jewelry	11
Strength	15	Perfume	16

L WHEN, IN THE COURSE OF human events, it becomes $12345&

L—Goudy Old Style

Cheapness	16	Automobiles	16
Dignity	11	Building Material	17
Economy	8	Coffee	17
Luxury	15	Jewelry	10
Strength	20	Perfume	9

M WHEN, in the course of human events, it becomes necessary for one people to dissolve $1234567&

M—Scotch Roman

Cheapness	19	Automobiles	13
Dignity	19	Building Material	13
Economy	3	Coffee	12
Luxury	20	Jewelry	16
Strength	14	Perfume	17

N WHEN, IN THE COURSE OF HUMAN EVENTS, IT BECOMES necessary for one people to dissolve the political bands which have $1234.

N—Circular Gothic No. 44

Cheapness	20	Automobiles	28
Dignity	10	Building Material	26
Economy	16	Coffee	28
Luxury	8	Jewelry	5
Strength	26	Perfume	3

O **WHEN, IN THE COURSE of human events, it becomes necessary for one $1234&**

O—Antique Bold

Cheapness	1	Automobiles	3
Dignity	27	Building Material	1
Economy	18	Coffee	3
Luxury	26	Jewelry	28
Strength	2	Perfume	25

P **WHEN, IN THE COURSE of human events, it $123&**

P—Masterman

Cheapness	5	Automobiles	2
Dignity	26	Building Material	2
Economy	20	Coffee	6
Luxury	23	Jewelry	26
Strength	4	Perfume	24

Q *When in the Course of Human Events, it becomes necessary for one people to dissolve the political bands which have connected them with another, and to assume, among the powers of the earth, the separate and equal station to which $12345678908*

Q—Typo Slope

Cheapness	28	Automobiles	29
Dignity	5	Building Material	29
Economy	26	Coffee	29
Luxury	3	Jewelry	2
Strength	29	Perfume	1

R WHEN, IN THE COURSE
of human events, it $123&

R—Gentury Bold

Cheapness	6	Automobiles	1
Dignity	29	Building Material	3.5
Economy	21	Coffee	7
Luxury	27	Jewelry	24
Strength	5	Perfume	23

WHEN, in the course of human
s events, it becomes necessary
for one people to dis- $12345&

S—Post Monotone

Cheapness	12	Automobiles	11
Dignity	16	Building Material	11
Economy	7	Coffee	9
Luxury	21	Jewelry	18
Strength	10	Perfume	18

T WHEN, IN THE COURSE OF
human events, it beco $123456&

T—Caslon Old Style

Cheapness	9	Automobiles	5
Dignity	18	Building Material	12
Economy	10	Coffee	8
Luxury	19	Jewelry	17
Strength	11	Perfume	20

U WHEN, IN THE COURSE OF $12

U—Cheltenham Bold Outline

Cheapness	26	Automobiles	21
Dignity	8.5	Building Material	21
Economy	23	Coffee	20
Luxury	9	Jewelry	6
Strength	23	Perfume	7

V When, in the Course of Human Events,

	V—Tiffany Text		
Cheapness	29	Automobiles	18
Dignity	2	Building Material	28
Economy	25	Coffee	26
Luxury	1	Jewelry	3.5
Strength	28	Perfume	5

W WHEN, in the course of human events, it becomes $1234

	W—Bookman Old Style		
Cheapness	10	Automobiles	10
Dignity	24	Building Material	10
Economy	1	Coffee	13
Luxury	22	Jewelry	21
Strength	12	Perfume	19

X WHEN, IN THE COURSE OF human events, it becomes $1234&

	X—Cheltenham Bold		
Cheapness	8	Automobiles	4
Dignity	21	Building Material	6
Economy	12	Coffee	5
Luxury	24	Jewelry	23
Strength	7	Perfume	26

Y WHEN, IN THE COURSE OF H events, it becomes nec $1234

	Y—Globe Gothic Bold		
Cheapness	3	Automobiles	14
Diginty	28	Building Material	5
Economy	17	Coffee	1
Luxury	29	Jewelry	29
Strength	1	Perfume	29

Z WHEN, IN THE COURSE OF HUMAN EVENTS

	Z—Engraver's Roman		
Cheapness	27	Automobiles	27
Dignity	3	Building Material	27
Economy	22	Coffee	24
Luxury	2	Jewelry	1
Strength	25	Perfume	4

XI WHEN, IN THE COURE OF HU events, it becomes necessary $12

	X¹—Roycroft		
Cheapness	4	Automobiles	8.5
Dignity	25	Building Material	7
Economy	15	Coffee	4
Luxury	28	Jewelry	27
Strength	6	Perfume	27

YI WHEN, IN THE COURSE OF HU-man events, it becomes $123456&

	Y¹—Bulfinch		
Cheapness	18	Automobiles	19
Dignity	20	Building Material	14
Economy	13	Coffee	15
Luxury	14	Jewelry	14
Strength	14	Perfume	15

ZI When, in the Course of Human $123

	Z¹—Priory Text		
Cheapness	23	Automobiles	26
Dignity	1	Building Material	24
Economy	29	Coffee	25
Luxury	5	Jewelry	9
Strength	22	Perfume	13

An examination of the positions assigned to the specimens when judged for the ten types of appropriateness shows that their relative effectiveness varies according to the purpose for which they are to be used. Differences in the degree of variation are also to be noted. For example, specimen Y^1 varies only from position 13 to position 20 in the ten categories, while Z^1 varies all the way from 1 to 29. The former type specimen would serve moderately well for any purpose, while the latter is either very apropriate or very inappropriate. The same may be said of specimen Z. The range and distribution of the positions assigned to the type specimens may be observed readily from Table II. The positions from 1 to 29 are arranged in six groups, indicated across the top of the table. The figures in the body of the table indicate the number of times that a given specimen fell in a certain group regardless of the commodity for which it was judged. Thus specimen A was twice given a position within the 5-9 group, and 4 times within the 10-14 group. More detailed information concerning range and distribution may be obtained from the figures given under each of the type specimens.

If values be assigned to the groups in Table II, so that the first group is given a value of 1, the second group is given a value of 2, etc., the total value assigned to each type face may be roughly determined. Such total values would indicate which type, if any, tended to be consistently appropriate or inappropriate wherever used. These values are given in Table III. No one of the specimens stands out as generally best or generally poorest. Specimen B appears to be the most effective for all purposes and specimen J the least effective. But the differences are slight.

TABLE III

A	32	G	30	M	34	S	33	Y	36
B	29	H	38	N	41	T	32	Z	38
C	32	I	34	O	32	U	39	X^1	36
D	38	J	42	P	34	V	39	Y^1	36
E	35	K	40	Q	41	W	35	Z^1	41
F	38	L	35	R	35	X	33		

The relation among the orders for the different categories may be expressed in terms of coefficients of correlation, the higher the positive correlation the greater the similarity among the orders for the different categories. The coefficients obtained by the Rank Difference Method are given in Table IV for the men and in Table V for the women.

In interpreting these figures it should be remembered that the

TABLE II

RANGE OF POSITIONS ASSIGNED TO EACH SPECIMEN

Type	Position 1-4	5-9	10-14	15-19	20-24	25-29
A		2	4	4		
B		4	1	2	2	
C	4	1	1		1	3
D		4		2	2	2
E		1	3	6		
F		2	3		5	
G		1	8	1		
H	2	2		1	2	3
I	1	2	2	2	3	
J	1		1	3	4	1
K	2		1	2	3	2
L		2	2	5	1	
M	1		4	4	1	
N	1	2	1	1	1	4
O	4			1		4
P	3	2			3	2
Q	3	1				6
R	2	3			3	2
S		2	4	3	1	
T		3	3	3	1	
U		4			5	1
V	3	1		1		5
W	1		5	1	3	
X	1	4	1		3	1
Y	3	1	1	1		4
Z	4				2	4
X'	2	3		1		4
Y'			5	4	1	
Z'	1	2	1		3	3

groups of persons judging were not the same for any two categories and that rarely was the same judge used twice. Thus, the high negative correlation[3] between the orders for Cheapness and Dignity (–.34) or between Cheapness and Luxury (–.94) represents a real difference in effectiveness and not merely a tendency on the part of the judges to be logical, in placing a given specimen high for one quality and low for some contrasting quality. The coefficients for Cheapness and Economy (+.47) and for Dignity and Luxury (+.96) are high and positive. Strength correlates positively with Cheapness (+.82) and with Economy (+.31) while it correlates negatively with Luxury (–.96) and with Dignity (–.89). Plain heavy type, while indicating strength, also suggest cheapness and economy as compared with the more delicate and ornate type forms.

A coefficient of correlation of +.94 between the orders for Jewelry and Perfume indicates that the type faces that are most appropriate for the one are also most appropriate for the other. These two commodities correlate with the orders for Automobiles and Building Material –.95 and –.92 respectively, showing that the type forms most effective for the one group are the least effective for the other group.

The order for Coffee, while quite similar to that for Building Material (+.90) and for Automobiles (+.81) is quite different from that for Jewelry (–.91) and Perfume (–.96).

Interesting comparisons may be made between the abstract group (Dignity, Economy, etc.) and the commodity group (Automobiles, Building Material, etc.) Cheapness correlates positively and high with Coffee (+.90) and negatively and high with Jewelry (–.94,), and Perfume (–.88). Dignity correlates high and positive with Jewelry (+.89) and with Perfume (+.80). The orders for Economy and Automobiles show a correlation of +.28, Economy and Building Material +.40, and Economy with Coffee +.38. There is a negative relationship between the orders for Economy and Jewelry (–.38) and Economy and Perfume (–.29). The coefficients in which Economy is concerned are the lowest to be found in the table. Luxury correlates high and positively with Jewelry (+.93) and Perfume (+.88) and negatively with the other commodities. Strength correlates high and positively with Automobiles (+.73), Building Material (+.93) and Coffee (+.91), but negatively and high with Jewelry (–1.00) and Perfume (–1.00).

[3]The following interpretations will be based on the figures for men given in Table IV.

TABLE IV

CORRELATIONS AMONG THE ORDERS FOR MEN

		1	2	3	4	5	6	7	8	9	10
Cheapness	1	—	−.84	+.47	−.94	+.82	+.78	+.93	+.90	−.94	−.88
Dignity	2	—	—	−.73	+.96	−.89	−.76	−.91	−.85	+.89	+.80
Economy	3	—	—	—	−.48	+.31	+.28	+.40	+.38	−.38	−.29
Luxury	4	—	—	—	—	−.96	−.79	−.94	−.92	+.93	+.88
Strength	5	—	—	—	—	—	+.73	+.93	+.91	−1.0	−1.0
Automobiles	6	—	—	—	—	—	—	+.82	+.81	−.74	−.64
Bldg. Material	7	—	—	—	—	—	—	—	+.90	−.95	−.92
Coffee	8	—	—	—	—	—	—	—	—	−.91	−.96
Jewelry	9	—	—	—	—	—	—	—	—	—	+.94
Perfume	10	—	—	—	—	—	—	—	—	—	—

TABLE V

CORRELATIONS AMONG THE ORDERS FOR WOMEN

		1	2	3	4	5	6	7	8	9	10
Cheapness	1	—	−.91	+.55	−.87	+.94	+.93	+.99	+.80	−.95	−.94
Dignity	2	—	—	−.50	+.90	−.91	−.88	−.91	−.75	+.92	+.92
Economy	3	—	—	—	−.52	+.44	+.41	+.54	+.63	−.49	−.46
Luxury	4	—	—	—	—	−.83	−.81	−.86	−.64	+.88	+.87
Strength	5	—	—	—	—	—	+.92	+.95	+.82	−.93	−.85
Automobiles	6	—	—	—	—	—	—	+.93	+.75	−.94	−.91
Bldg. Material	7	—	—	—	—	—	—	—	+.80	−.95	−.95
Coffee	8	—	—	—	—	—	—	—	—	−.76	−.73
Jewelry	9	—	—	—	—	—	—	—	—	—	+.94
Perfume	10	—	—	—	—	—	—	—	—	—	—

TABLE VI.

CORRELATION BETWEEN MEN AND WOMEN FOR DIFFERENT CATEGORIES

Cheapness	+.91	Automobiles	+.81
Dignity	+.92	Building Material	+.97
Economy	+.93	Coffee	+.79
Luxury	+.93	Jewelry	+.94
Strength	+.94	Perfume	+.95

No differences worth noting appear between the records for men and women. (Tables IV and V). Table VI showing the relationship between the orders for men and women contains no coefficient lower than +.79. This similarity of the reactions in the two sexes gives additional evidence of the consistency of the judgments of appropriateness of material of this sort.

The results of this experiment show quite conclusively that differing type faces do vary in appropriateness and that judges are able to "feel" this appropriateness or lack or appropriateness. Furthermore, there is close agreement between sexes and among members of the same sex in the character of their reactions to the different type specimens.

The experiment produces no measure of the strength of these "feelings". Certainly, the pleasantness or unpleasantness of the effects produced by these different type faces must be extremely mild, and it might be argued that such differences as do exist are too slight to warrant consideration for practical purposes. However, the appropriateness of type is one factor among the many which determine the appropriateness of the advertisement as a whole and therefore cannot be safely neglected.

Some theoretical interest may attach to the question of the cause of the differences found in this experiment. There are two possible explanations. First, the type faces, by their shape, size, texture and the character of their lines may carry a certain atmosphere about them; there may be inherent in them an atmosphere of delicacy, dignity or strength. Second, the atmosphere which they possess may be merely a matter of use. For example, we are accustomed to seeing Old English or similar type, such as specimens K, V, or Z[1] used for imposing and dignified documents and plain, heavy type such as specimens O and Y for simple and ordinary printing purposes. By the process of association the type may now carry the qualities transferred from the settings in which they have habitually appeared.

For present practical purpose it would seem to make little difference which of these interpretations is correct. It is sufficient to know that type faces such as are used in current ad-

vertising practice do have characteristic atmosphere and that these should be given due weight.

One further point should be noted, namely, that the effectiveness of type faces such as we have used in this work cannot necessarily be predicted from the judgment of one individual, even though he may be an expert in typography. Only a test upon an adequate sampling of the population to be influenced will definitely determine what is the best type to use. The judgment of one individual may be safer where the more extreme forms of handlettering are under consideration, although even here some further check would be advisable. The effect upon a sampling of prospects must here, as in other cases of control of human behavior, be the final measure of what will or will not be effective.

INTELLIGENCE TESTS VERSUS ENTRANCE EXAMINATIONS AS A MEANS OF PREDICTING SUCCESS IN COLLEGE

By Ada Hart Arlitt and Margaret Hall
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This investigation begun in 1919 and completed in June, 1923 was undertaken to determine (1) the relative value of the record in intelligence tests and the record in entrance examinations as a means of predicting success in a college which admits only through the regular channels of entrance examinations, (2) the extent to which the record in intelligence tests could be used to exclude students who succeeded in passing entrance examinations but were not capable of doing adequate work in college, (3) the relative merits of two intelligence tests and entrance examination grades as a means of selecting the students who will do the least adequate work in college.

The subjects, 305 in all, were students who entered Bryn Mawr in 1919, 1920 and 1921. The test results for each class were treated separately. As a matter of convenience the classes will hereafter be termed Group I, Group II, and Group III in the order of the date of entrance into college. Students who withdrew for any reason other than poor work before the end of Freshman year and students who were given only one of the two test series in the class to which two sets of tests were given are not included in this study.

Group I was given the Stanford Revision of the Binet Test used in part as a group test. Interpretation of Fables (XVI, 2), Memory for Paragraph (XVIII, 4) and the Vocabulary Test (XVI, 1 and XVIII, 1) were given to the group as a whole. In the first two of these tests the procedure followed was the same as that outlined by Terman except that the responses of the students were written in a regulation college "Blue Book". For the Vocabulary Test each student was given the list of one hundred words printed with sufficient space after each word to allow for the writing of a definition. Ample time was allowed to finish each test. The Vocabulary Test was given last and the paper handed in as soon as completed. All of the other tests were given individually by the writer.

Group II was also given the Stanford Revision of the Binet

The writer wishes to acknowledge her deep indebtedness to Miss Edith Orlady, Secretary and Registrar of the College, for her constant co-operation and courtesy in furnishing the data as to entrance examination records and grades in college.

Test with the same procedure as that described above except that the Ingenuity Test (XVIII,6) was also given as a group test.[1] As soon as the time allowance of five minutes for each section of this test had elapsed the students turned over a page and began the new problem on a new sheet. In order to avoid work on a problem after the time limit for that problem was up, no student was allowed to turn back a single sheet for any purpose. The Thurstone Freshman Test, Series 1920 Number IV was also given to this group. Group III was given the Thurstone Freshman Test, Series 1919.

The results of the tests of Group I in terms of I. Q. were correlated with grades received in entrance examinations and with marks at the end of the Freshman, Sophomore and Junior years and at the middle of Senior year. Marks at the end of the Freshman and Sophomore years are in terms of the average of all percentage grades received by the student during the year. Marks in the Junior and Senior years are in terms of honor points,[2] Grades received in entrance examinations were also correlated with marks at the end of the Freshman, Sophomore and Junior years and at the middle of Senior year. The formula used was the Product Moment with computations from the true average:

$$\frac{\Sigma xy}{\sqrt{\Sigma x^2}\ \sqrt{\Sigma y^2}}$$

The results are presented in Table I.

TABLE I

No. of students		r	P. E.
98	Entrance grades and marks end of Freshman year	.539	.048
83	Entrance grades and marks end of Sophomore year	.548	.052
74	Entrance grades and marks end of Junior year	.541	.055
74	Entrance grades and marks middle of Senior year	.542	.056
98	I. Q.'s and Entrance grades	.245	.064
98	I. Q.'s and marks end of Freshman year	.298	.062
83	I. Q.'s and marks end of Sophomore year	.097	.073
74	I. Q.'s and marks end of Junior year	.102	.078
73	I. Q.'s and marks middle of Senior year	.100	.078

As will be seen from Table I, I. Q.'s show a positive but low

[1]This test did not lend itself well to use as a group test in as much as the time allowed for each unit was too great for over half of the students tested, but all had to wait until the end of the time allowed.

[2]A certain number of honor points is allowed for each hour of work of High Credit, Credit and Merit grade.

correlation[3] with marks at the end of Freshman year and a negligible correlation with marks at the end of Sophomore and Junior years. Grades received in entrance examination show a marked positive correlation with marks received by the end of each of the three college years. The coefficient of correlation for entrance grades and marks received in academic work is almost twice as large as that for I. Q.'s and marks at the end of Freshman year and is more than four times as large as the coefficient of correlation for I. Q.'s and college marks at the end of Sophomore and Junior years and at the middle of Senior year.[4]

The results obtained from correlating the two intelligence tests used with Group II with marks received in academic work, and entrance examination grades with college marks are presented in Table II. I. Q.'s show a positive but low correlation with college marks at the end of Freshman year (.197±.064) and at the end of Sophomore year (.166±.070). Thurstone Test Scores show a higher correlation with college marks at the end of both years than do I. Q.'s. The correlation between entrance grades and college marks at the end of the Freshman year is .520±.048 and at the end of Sophomore year is .486±.055.

TABLE II

No. of students		r	P.E.
103	Entrance grades and marks end of Freshman year	.520	.048
88	Entrance grades and marks end of Sophomore year	.486	.055
103	Entrance grades and I. Q.	.190	.064
103	I. Q. and Freshman marks	.197	.064
88	I. Q. and Sophomore marks	.166	.070
103	I. Q. and Thurstone Scores	.223	.063
103	Thurstone Scores and Freshman marks	.274	.061
88	Thurstone Scores and Sophomore marks	.293	.066

Here, as with Group I, entrance grades show a much higher correlation with Academic success than do the scores in either of the Intelligence Tests.

The results from Group III are presented in Table III. Entrance grades correlate .638±.039 with marks received in the

[3]The classification followed here is Rugg's. Rugg, H. O. Statistical Methods Applied to Education, p. 256. (Houghton Mifflin Co. 1917.)

[4]The marked decrease in the size of the co-efficient beyond the Freshman year may be explained in part by the fact that a number of students low in both grades and scores in intelligence tests withdrew at the end of the Freshman year. This does not, however, account for all of the change.

Freshman year while Thurstone scores show a correlation of .347 ±.058 with Freshman marks.

TABLE III

No. of students		r	P.E.
104	Entrance grades and marks end of Freshman year	.638	.039
104	Thurstone Scores and marks end of Freshman year	.347	.058
104	Thurstone Scores and entrance grades	.298	.060

The results presented in Tables I, II and III show that of the three Measures on which prediction of success in the Freshman year in college might be based, grades in entrance examinations rank first, Thurstone Test scores next and I. Q.'s last. In the case of the last two measures the difference between the sizes of the correlation coefficients in the one group to which both tests were administered in 7.7 points at the end of the Freshman year and 12.7 points at the end of the Sophomore year. No one of the three measures show a correlation which may be regarded as "high" according to Rugg's Classification except in the case of entrance grades and Freshman marks in Group III.

A study was then undertaken to determine whether the records in intelligence tests might have been used to exclude students who, although able to pass the entrance examination, made unusually poor records in college. Each group was divided into quartiles according to rank in college marks. Table IV shows the distribution in quartiles according to rank in college marks of the students at or below the 25th percentile in entrance grades, in Thurstone scores and in I. Q.'s. In the case of Groups I and II a low grade in entrance examinations is more indicative that the student will do less than average work in college than is a low score in intelligence tests as is shown by the fact that a larger per cent of the students ranking below the 25th percentile in entrance grade rank below the 25th percentile and median in college grade. Of the students ranking below the 25 percentile in I. Q. in Groups I and II, 47% rank below the median in college grade at the end of Freshman and Sophomore years. Of those ranking below the 25 percentile in Thurstone scores 60% rank below the median in college grade and of those ranking below the 25 percentile in entrance grade 70% rank below the median in college grade. In Group III the intelligence test and entrance grade select the poorer students almost equally well, but the Thurstone test shows

TABLE IV

DISTRIBUTION IN RANK IN COLLEGE MARKS.

Group	No. students below 25 percentile in Intelligence Quotient	Year	No. below 25 percentile	No. between 25 and 50 percentile	No. between 50 and 75 percentile	No. above 75 percentile
I	24	Freshman	9	6	6	3
I	18	Sophomore	5	3	5	5
II	26	Freshman	6	5	8	7
II	21	Sophomore	3	5	7	6
	No. of students below 25 percentile in Entrance Examination					
I	24	Freshman	10	9	3	2
I	17	Sophomore	7	5	4	1
II	26	Freshman	11	6	7	2
II	21	Sophomore	9	5	4	3
III	26	Freshman	10	9	7	0
	No. below 25 percentile in Thurstone Score					
II	26	Freshman	7	9	7	3
II	22	Sophomore	8	5	6	3
III	26	Freshman	10	11	3	2

itself to be slightly superior to the entrance grade. Of the students ranking below the 25th percentile in Thurstone score 80% rank below median in college marks as against 76% in the case of those ranking below the 25th percentile in entrance grades.

As a final test of the selective capacity of the three measures, a comparison was made of the standing in college of the six students ranking lowest in entrance grades, the six ranking lowest in I. Q., and the six ranking lowest in Thurstone scores in each group. This represents approximately the lowest 6% of the group. Of the six students ranking lowest in I. Q. in Group I three were below the 25th percentile of the class in college grades, two were between the 25th percentile and the median, none between the median and 75th percentile and one above the 75th percentile. Two of the three students below the 25th percentile were dropped at the end of Freshman year because of poor work. None of the six lowest in entrance grades were dropped and only one of the six was below the 25th percentile.

The six students in Group II ranking lowest in Thurstone score were distributed as follows: one was below the 25th perecentile, two were between the 25th percentile and median, two were between

the median and 75th percentile and one was above the 75th percentile. Of the six ranking lowest in I. Q. two were dropped at the end of the year because of poor work, two were between the 25th percentile and median and two between the median and 75th percentile. Of the six ranking lowest in entrance grades two were below the 25th percentile, three between the 25th percentile and median and one between the median and 75th percentile. None of the six ranking lowest in entrance grades were dropped because of poor work. Of the six students ranking lowest in Thurstone score in Group III one was dropped because of poor work, and of the six lowest in entrance grade one was dropped.

Although the Thurstone Test is, as has been shown by its correlations, a better measure on which to base prediction of success in college than is the I. Q. and although entrance grades is a better measure on which to base prediction of success in college than is the score in either of the intelligence tests, the I. Q. selects the students who will do the poorest work in college better than does either the score in Thurstone Test or the grade in entrance examinations. A study, however, of the distribution by quartiles in rank in college grade of the six students lowest in intelligence tests will serve to show that to use the results of such tests to eliminate students who have passed the entrance examinations would be manifestly unfair.

The result of our tests show three things (1) that neither the Thurstone Test score nor the I. Q. correlated as highly with marks received in college as did grades received in entrance examinations, (2) that the Intelligence Tests could not with fairness be used to exclude students who had passed the entrance examinations since a large percentage of the students at or below the 25th percentile in Intelligence Test score do adequate college work and less than half of the lowest five per cent in Intelligence Tests are excluded from college for poor work, (3) that the I. Q.'s selected the students whose work proved poorest, better than did the entrance examination grade or the score in the Thurstone Test.

That our results are in no way unique can be seen from a comparision of our results with those of previous investigators in the same field. The following table cited from Caldwell brings together the data from a number of such studies.

The coefficient of correlation between college marks and intelli-

gence tests is shown in the column at the right.

Wissler	.09
Calfee	.23
Rowland and Lowden	.37
Waugh	.41
Bell	.31
Kitson	.44
King and McCrory	.39
Caldwell	.44

To the above table may be added the following:

	Year	r	No. students	Tests used
Caldwell	Sophomores	.17	24	Stanford Revision
	Junior	.69	24	Stanford Revision
Kitson	(Second group)	.20	40	16 Selected Tests
Rogers	Seniors	.42	92	Thorndike Mental Alertness A.
	Seniors	.39	92	Thorndike Mental Alertness K.
	Freshmen	.37	182	Thorndike Mental Alertness A.
	Freshmen	.37	182	Thorndike Mental Alertness K.
	Freshmen	.23	182	Reasoning I Rogers
	Freshmen	.12	182	Reasoning Ia Rog.
Colvin	Freshmen	.5981	103	Brown U. Tests
	Freshmen	.4567	210	Army Alpha

The coefficient of correlation in the studies cited in which tests other than the Stanford Binet were used ranged from .09 to .59 but in most instances varies by not more than ten points from our results with the Thurstone Tests. The only results comparable with ours for the Stanford Binet are Caldwell's. Here the coefficient of correlation for Sophomores was about the same as that in our results for Sophomores in Group II but the coefficient of correlation for Juniors was much larger than ours due perhaps to the difference in the size of the groups.

The fact that in our study scores in intelligence tests and college marks do not show closer agreement may be explained in several ways. In the first place, as has been pointed out earlier in this study, the students dealt with are a highly selected group from which the less able individuals have been for the most part eliminated by failure to pass the entrance examinations. All but seven of the 201 students given the Stanford Binet have I. Q.'s above 100 and the large majority of the students have mental ages above

seventeen. As to Thurstone scores the lowest student in Group II scores at the 19th percentile according to the norms for this test. The lowest student in Group III also scores at the 19th percentile. The level of intelligence in the case of practically every student is high enough to warrant adequate work in college if interest, habit of work and the necessary preparation are also present. Factors other than intelligence may therefore play a large part in the student's success.

In the second place very intelligent students have often not been trained to work to the limit of their capacity in the lower schools. Their mental level has been high enough to enable them to do fairly satisfactory work with a minimum of effort. These students enter college with inadequate preparation as shown by low grades in entrance examinations and with the habit of working only enough to "get through." If this habit persists through all four college years it may lead to a very intelligent student's receiving poor marks.

In the third place some of the most intelligent students are not interested primarily in college work, and unless pride in academic success is sufficient to make these students put forth a determined effort to obtain high grades most of their energy may find its outlet in extra curriculum activities.

Lastly the low correlation between the two intelligence tests used by us (.223) suggests that the validity of one or perhaps of both as tests which will differentiate between mental levels in adults may not be as great as could be desired. It may well be that we are expecting more of the tests of college students than we have expected of tests of children below fourteen. Our problem here is that of differentiating between abilities at the top of the scale, a far more difficult one than that of separating into groups the whole range of mental ability. It is probable that this problem will require as many years for its solution as elapsed between Binet's first experiments with the thirty tests in his original series and the publication of the Stanford Revision of the Binet Tests in 1915.

Full cooperation of college authorities and experimenters in the field of adult testing will, it is to be hoped, produce tests as valuable to the college as the Stanford Revision of the Binet Test has been to the lower schools.

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A RE-INTERPRETATION OF THE STATISTICAL METHOD OF ARMY TRADE TESTS

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The procedure followed by the Army Trade Test Division in the construction of oral trade tests has been described in several books and articles[1]. We shall, therefore, include in the present paper only a brief summary of the statistical method used in the treatment of test questions. This will serve as a basis for our critical discussion.

For each trade question on which standardization data were collected, a graph like that shown in Figure I was constructed.

The question is scored from 4 to 0, for a correct answer, 0 for incorrect, and intermediate scores for partially correct answers[2]. In the graph the scores are read in the column to the left, while across the top are arranged the four trade classes—Novice, Apprentice, Journeyman, and Expert. The number of men of a given trade status making each score is entered in the table. Thus, 2 Novices scored 4; 8 Apprentices scored 4; 18 Novices scored 0; and so on. Twenty men of each class of ability are represented in the graph. The average score for each class is obtained and entered at the foot of the chart. These averages are plotted and a curve drawn to show graphically the relation between trade status and score. On the basis of an inspection of these graphs questions were retained or eliminated.

From those questions which were selected as showing sufficiently "good" graphs, the ones were retained which, in combination, would give the best discrimination between Novices and Apprenties, Apprentices and Journeymen, and Journeymen and Experts. The final test consisted of some ten to twenty questions, the combined score on which was then used in classifying the individual tests.

We shall attempt to examine critically both the treatment of individual trade questions and the method of combining and using these questions. The first—the manner of evaluating questions—

[1]The Personnel System of the United States Army. Washington: Adjutant General's Department, 1919. Chapter 29.
J. C. Chapman. Trade Tests. New York: Holt, 1921.
Additional references may be found in the last mentioned book.

[2]Partial scores were rarely used in actual practice. None are present in our illustration. Throughout the present paper we shall entirely ignore partial scores and shall speak of passing and failing as the only alternatives.

requires a statistical re-interpretation. The second, which has to do with the form of the test as a whole, is principally a matter of convenience and practical usefulness.

The method of evaluating the individual questions appear at once to be open to criticism regarding the statistical logic employed. The procedure makes use of the wrong regression line in considering the relation of ability and score. The inquiry made by the technique used is: What are the average scores made by tradesmen of the several grades of ability? The proper question would be: What is the average (or most probable) trade status of tradesmen making a particular score on a question?

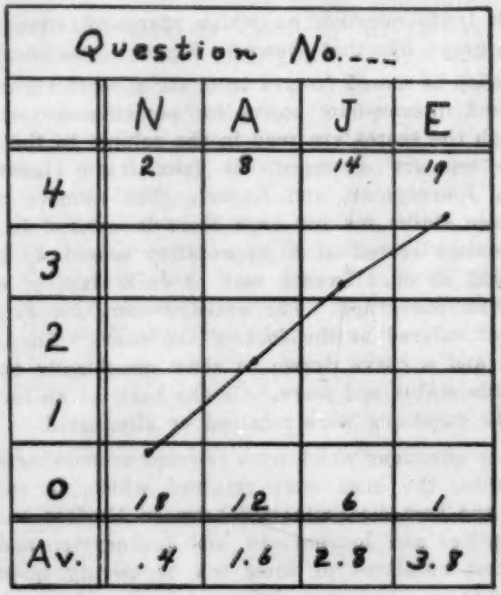


Figure 1.

On more careful examination, however, it will be found that while the procedure described does plot the wrong regression line, actually that regression relation is not used as a means of prediction. The regression *equation* that is, is not made use of either explicitly or implicitly.

In order to make clear the indirect use to which the regression of score on trade status is put, we shall first discuss the logic underlying the evaluation and combining of questions. It will

then be noted wherein the Army method meets, and wherein it does not meet, the statistical requirements.

The problem which we have, if we ask how well we can actually predict trade status from score on the individual question may be formulated more definitely thus: What are the numerical odds that a man passing (or failing) a question is of one trade status rather than another?

A logical procedure for determining these odds follows:

(1) Let n_x, a_x, j_x, and e_x represent the numbers of Novices, Apprentices, Journeymen and Experts respectively who take a given question, x.

(2) Assume that $n_x = a_x = j_x = e_x$.
(This is done in practice by using percentages, i. e., by referring results to a basis of 100 individuals in each trade class.)

(3) And let n_{rx}, a_{rx}, j_{rx}, and e_{rx} represent respectively the numbers of Novices, Apprentices, Journeymen, and Experts who give a "right" answer to the question x.

(4) Similarly n_{wx}, a_{wx}, j_{wx}, and e_{wx} represent the numbers who give a "wrong" answer to the question.

(5) Then clearly, the ratio of a_{rx} to n_{rx} expresses the odds that a man passing question x is an Apprentice rather than a Novice, assuming $n_x = a_x = j_x = e_x$.

(6) Corresponding statements hold for the ratios j_{rx} to a_{rx} and e_{rx} to j_{rx}, and for ratios using percentages of failures in place of successes.

Now these numerical expressions of the odds constitute precisely the sort of relations we desire save, of course, that we must in practice take into consideration the actual *inequality* of n_x, a_x, j_x, and e_x. The proper allowance for these inequalities can be made only on the basis of data which will indicate roughly, at least, what the proportion of Novices, Apprentices, Journeymen, and Experts are among men actually applying for employment in the given situation.

(7) If now, N, A, J, and E represent the actual numbers of

tradesmen applying,

(8) Then, $\frac{A}{N} \times \frac{a_r^x}{n_r^x}$ = the odds that a man who passes question x is an Apprentice rather than a Novice. That is to say, the formulation of (5) must be corrected by weighting the items in accordance with the actual number of Novices and Apprentices who are applicants. It is to be especially noted that for the purpose of comparing one question with another the weighting is wholly unnecessary. Since it remains constant, the relative merits of questions can be judged quite as well by using simply the ratios of the type, $\frac{a_r^x}{n_r^x}$.

The expression (8) stands, then, as the general answer to our question, by stating simply what the odds are, that a man passing a question is of one trade status rather than of another. Corresponding expressions may readily be written for other class differentiations and for situations in which the answer to the trade question is wrong instead of right.

Let us now return to the Army procedure and examine it in the light of the preceding discussion. When the average score on a question was obtained for each trade class, what was really secured (as is evident from the nature of the computation) was the percentage of the class who passed, multiplied by a constant factor, 4. The regression line that was graphed, therefore, may be thought of simply as a curve showing the per cents of individuals passing at successive trade levels.

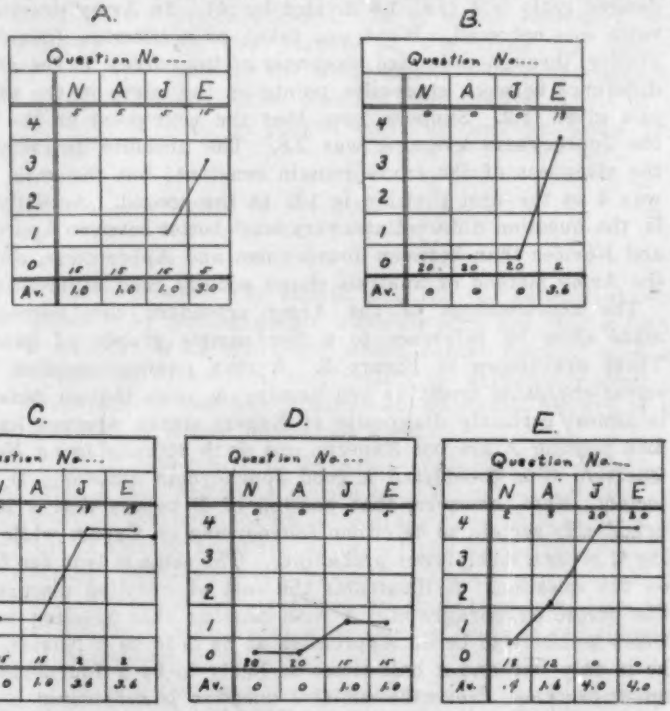
To the extent that the regression line or curve of per cents was of use in comparing the percentages of passes at adjacent trade status levels, it possessed a certain value in indicating the proper selection of questions; to the extent that it gave a false notion of the relative excellence of differentiation at the several levels, it was unsatisfactory. The sharpness of rise in the curve between two groups was considered the significant fact. The height of the point from which the rise takes place plays an important part which was not sufficiently considered in the Army procedure. Consider this point in greater detail. As indicated in our theore-

tical discussion, the critical expressions for determining differentiation are the ratios of the type, $\frac{r_{a_x}}{r_{n_x}}$. This ratio *can* be obtained directly from the curve plotted for each question in the old procedure. For example, (See Figure 1) if the curve rises from .4 (Novice average) to 1.6 (Apprentice average), the desired ratio is 4 (i.e., 1.6 divided by .4). In Army practice this ratio was not read. What *was* taken as a criterion (usually implicitly, through estimated steepness of the curve) is the *absolute* difference between successive points on the curve in the example just given, 1.2. Suppose, now, that the next point on the curve, the Journeyman average, was 2.8. The absolute difference and the steepness of the curve remain constant; but the ratio which was 4 at the first division is 1¾ at the second. Actually, that is, the question differentiates very much better between Apprentices and Novices than between Journeymen and Apprentices, although the Army method of analysis shows equally good differentiation.

The shortcomings of the Army procedure can, perhaps, be made clear by reference to a few sample graphs of questions. These are shown in Figure 2. A man passing question B receives the same credit as one passing A, even though passing B is almost certainly diagnostic of Expert status whereas half the men passing A are not Experts, one sixth actually being Novices. Question C is considered a good Journeyman question; D is rejected. Note, however, that passing of D means that a man is practically certain to be either Journeyman or Expert while passing C gives a much lower probability. The same is true for failure on the question. E illustrates the sort of question discussed in the preceding paragraph. A man passing this question is four times as likely to be an Apprentice as he is to be a Novice, while he is only two and a half times as likely to be a Journeyman as an Apprentice. Nevertheless, this question is considered a Journeyman question simply because the curve rises more sharply at that level.

In concluding this discussion of the Army procedure a word is to be said regarding the satisfactory (on the whole) results obtained. Two prime requirements for Army trade tests were speed of production and simplicity of administration. These requirements were met by the technique used. Any slight gains in accuracy that could have been made through more refined statistical treatment, it may well be argued, would not have been worth

the trouble. The fairly good results that were obtained by rough methods were in part due to the following considerations: (1) Questions were combined that did show good differentiation at the several trade levels. The differentiation was satisfactorily shown by the inexact method for the reason that ordinarily very good differentiation occurred at only one class division and this division point could be detected by merely noting the rise in the curve. Hence good results were secured though it seems reasonable to believe that the same quality of results might have been



obtained with shorter tests and less waste of questions. (2) Since a fairly large number of questions was asked, the errors made in crediting separate questions were likely to be compensating.

The conclusion that the Army method of evaluating questions was at fault and that the practical choice of questions was to some extent adversely influenced by the statistical method utilized appears to be justified. The question at once arises whether a more satisfactory trade test method can be built, using the sort of statistical foundation we have outlined. The remainder of

the paper will be devoted to some tentative suggestions for a type of trade test which does make use of the method presented for the evaluation of single questions, and which will at the same time have certain advantages as compared with the Army technique in the manner of the combining and using of questions.

The Army oral trade test consists of a fixed list of questions with norms established for the total list. A method of test construction which would make possible the treating of individual questions as standardized units, in place of having the entire test as the standardized unit, would have decided advantages in point of practical usefulness. Among the advantages are: (1) The test may be made more brief when desirable. (2) It may be varied to prevent coaching and to allow for unusual circumstances. (3) In testing the examinee it is unnecessary to give questions of all degrees of difficulty; that is, questions less difficult than those already passed need not be given, nor questions more difficult than those already failed. (4) The test may be continually developed by the incorporation of new questions, standardized in connection with the use of the existing questions. (5) Questions which prove undesirable for any reason may be dropped without necessitating any change in the remainder of the test.

In addition to these practical advantages listed, a system of trade test construction based upon the theoretical discussion in Part II, would have a more logical statistical foundation than have Army trade tests.

What, now, are the difficulties in the way of a new trade test method of the sort we have been pointing toward? Is it possible for us to lay down some definite suggestions as to the form of a trade test built on the single question basis and to outline a mode of procedure? The answer is that there exists one most formidable obstacle, namely, the absence of a sound method for combining the results from the single questions. Concretely, how shall we combine the ratios showing the odds in an example such as the following? Let us say the applicant is given five questions, three of which are passed and two of which are failed. We have the following odds from the several questions: Question 1 (passed) shows that his chances of being Apprentice rather than Novice are 9 to 1; question 2 (passed) shows that his chances of being Journeyman rather than Apprentice are 7 to 3; question 3 (failed) shows that his chances of being Expert rather than Journeyman are 2 to 8; question 4 (passed) shows that his chances of being Journeyman rather than Apprentice are 8 to 2; and question 5 (failed), shows that his chances of being Journeyman rather than Apprentice are 3 to 7. What, now, are the probabil-

ities that this individual is a Journeyman, judging on the basis of all the questions?

The usual way to combine probabilities in answer to such a question is to multiply the ratios. Thus, in coin tossing, for example, the chances that one coin will come up heads is 1/2; the chances that two coins will come up heads at the same time is 1/2 x 1/2. Applying this sort of method to the above example, we would obtain the combined odds from the five questions by multiplying the ratios given. We would have, that is $\frac{9 \times 7 \times 2 \times 8 \times 3}{1 \times 3 \times 8 \times 2 \times 7} = \frac{9}{1}$. But this gives false results. This multiplying of probabilities is based upon the assumption of independence (lack of correlation) between the several events. However, the passing and failing of particular trade questions is clearly not uncorrelated with the passing and failing of other trade questions. It might appear at first that we could correct for the intercorrelations among questions by means of the partial correlation procedure. This, however, is impossible because of the inapplicability of the partial correlation method in the case of non-linear regressions. That the regressions of trade questions are not linear was clearly demonstrated by Army experience. The writer knows of no way by which this problem of combining probabilities from different trade questions can be handled mathematically.

We apparently, then, are forced into a position where we must either abandon the proposed sort of trade test or find some makeshift for combining questions. We shall briefly state one or two tentative suggestions in the latter direction. An empirical procedure for combining individual questions, even though it fall far short of what would be theoretically desirable, may nevertheless be sufficiently valuable to warrant the use of the proposed sort of trade test.

We shall mention two possible lines along which an empirical procedure might be developed. The essential requirement is that due provision be made to guard against the use of many closely intercorrelated questions in the examination of an individual. This may be accomplished either (1) by classifying appropriate questions into fixed groups placed at several levels of difficulty (analagous to Binet age groups), or (2) by having at each level a large number of questions which are sorted into classes of questions having relatively low correlations with questions in other classes.

The first of these suggested possibilities has some, but not all, of the advantages earlier mentioned as characteristic of a test

which would flexibly combine single standardized questions. In this method we would have a compromise between the standardized single question and the standardized complete test. Here, the whole group of questions at the Apprentice, Journeyman, or Expert, level must be treated as a unit. This trade level form of test, while somewhat similar to the Binet age level method, has several significant differences. Among these are the following: (1) Questions are placed at the level where they differentiate best, not where a certain per cent of the individuals tested have passed. (2) Questions are weighted in proportion to their differentiating value; i. e., on the basis of the probability ratios earlier discussed. (3) Questions are weighted differently if passed and if failed. (These modifications would appear to be applicable to age-level tests like the Binet as well as to trade tests.)

The second suggestion of a procedure for trade test construction has certain advantages over and above those of the fixed trade level grouping just considered. It is essentially the same, save that greater flexibility is introduced in the use of questions. It carries very much further the idea of alternative tests which have been placed at some of the age-levels in revised Binet tests. In place of having a fixed set of questions at, say, the Journeyman level, we have a great many questions. These are classified according to the divisions into which trade knowledge in this trade has been analyzed. In examining a candidate, the questions which are asked at a given trade level are chosen from the several classes into which the questions at that level have been distributed. This method appears to be a feasible empirical device to prevent a candidate's being judged upon his answers to a non-representative and highly intercorrelated set of questions.

We shall not enter into a description of the detailed methods of weighting, scoring, and combining scores, which would be used in the suggested procedure. Suffice it to say that the actual probabilities calculated for each question can be transmuted into simple "weights" (consisting of numbers proportional to the logarithms of the ratios of odds) which may then, at each level, be readily added. The sum of the "weights", regardless of the number of questions asked, will give a rough indication of the odds that the candidate is at that level or below it, based upon all the questions asked at that level. The questions are, of course, in this way being used as though they were not intercorrelated. For adding the logarithms is equivalent to multiplying the ratio and this is the theoretically correct method of combining probabilities when the events are uncorrelated. The composite probability that we get is, therefore, only a very rough approximation.

But inasmuch as the questions have been classified into groups not closely correlated with questions in other groups, and inasmuch as the combined probabilities will be thrown off in about the same degree and in the same direction for all candidates, the procedure appears to be usable. We again emphasize, however, that the method is offered only as a tentative suggestion, a makeshift procedure which may have advantages over the rigid type of Army trade test.

IV.

We may briefly summarize as follows:

1. The statistical procedure used in building Army trade tests appears to be open to criticism on the grounds that the regression of test score on trade status was used in place of the reverse relationship. Closer consideration reveals, however, that the regression relations which were calculated were not used as such.

2. In order to make clear the indirect use of the figures calculated in evaluating each test question, we have outlined, without reference to Army procedure, a logical basis for evaluating questions in terms of the probability relationships of trade status to scores on single questions.

3. The Army method was then compared with our discussion of a method which would use mathematical odds for each question, and the conclusion was reached that to a certain extent the Army procedure was actually comparing such percentage ratio, but not in a logically correct manner. The method used worked tolerably well, but, as shown by a few illustrations, it also failed in part.

4. Finally, we have attempted to suggest lines which a different technique of trade test construction might follow, based upon the theoretical discussion contained in the paper. The principal advantages of the proposed sort of test are indicated as well as the special difficulties involved.

A CASE OF SECONDARY MENTAL DEFICIENCY WITH MUSICAL TALENT

By Blanche M. Minogue

Before medicine and psychology had advanced to their present degree of development, the obviously defective in intelligence were regarded as being possessed by some superior power. The occasional "idiot-savant" with his extraordinary abilities must have seemed convincing proof of that theory. Modern psychological methods, however, enable us to understand to some extent these heretofore inexplicable creatures. In recent years several cases have been reported in considerable detail. They are usually moderately high grade defectives who possess special abilities, which stand out in startling contrast to learning ability, judgment, etc., which are noticeably below the average.

Among "idiot-savants" are occasional musical geniuses who are almost phenomenal. Although musical genius in itself is apparently something apart from general intelligence, it involves many of the attributes of intelligence. For this reason a case of marked musical talent combined with low general ability is the more remarkable. Such a case is that of a male patient, at Letchworth Village at the present time.

X. Y., a twenty-three year old boy, with a mental age of about seven years, is a pianist of marked ability. He has been in the institution for several years, and in that time has played at practically all of the social functions of the institution.

The family history seems free from any intelligence defect. The paternal line is of normal, if not superior, mentality. The father's father was a broker, and one cousin, an engineer, has been a successful inventor. The father, born in Hungary, earns a moderate salary as a shipping clerk. The father's mother is a pianist of exceptional ability. His sister's daughter is also an unusually gifted pianist. The other members of the family, including the father himself, show musical ability in moderation.

The maternal line is interesting. The mother, also born in Hungary, is a woman of superior intelligence and refinement. The entire family appear to be of more than average mental ability. All have achieved success in business. One brother has two children who were pronounced superior after a psychological examination. This branch of the family shows considerable emotional instability, and does not give any indication of musical talent.

The patient's sister is a very bright, attractive young woman of

about twenty-one years. She graduated from high school, winning recognition for her scholarshp. At present she is working and carrying college work in Extension School. She is a violinist, but does not show unusual talent.

The patient was born in 1900, in the United States. Everything connected with pre-natal life was favorable. Birth and infancy were normal. He was a bright, healthy child, walking at twenty months and talking at one year. As soon as he talked he learned little songs in English, German, French and Hungarian. He learned quickly and appeared to have intelligence, as well as musical ability, far above the average. Even in infancy, however, the child had periodic attacks of temper. His mother describes him as very amiable until some emotional experience such as surprise caused a sudden passionate outburst.

The boy developed normally until the age of three years. At that time he was severely ill with pneumonia, with complications which have since been diagnosed as meningitis. In the delirium of the disease he sang incessantly the songs he had learned. For many years after his recovery he showed great reluctance to sing. After this illness the child frequently had violent screaming spells and soon showed mental retardation. When seven years old he was taught at home for a year by a special teacher, and then entered grade 2A in the public schools. He made fair progress in reading, writing and arithmetic, but was teased so unmercifully by the other children that he had to be removed from school.

He received piano instruction for two years under excellent teachers but was very abusive to them. As he became older he often became voluble on the streets, and attracted crowds of people. He became the victim of unscrupulous persons in the neighborhood and so was committed to Letchworth Village.

Since admission to the institution X. has not been a discipline problem. He does light work around the cottage, and plays the piano much of the time. As he is not very robust he requires sleep during the day. He lacks many characteristics of the feeble-minded. His muscular coordination is very good; he walks briskly, without the usual shuffling gait of the mental defective.

X. takes great pride in his musical accomplishments. He plays the most difficult music by sight and by ear. His ability to render classical and concert pieces, as well as the modern "jazz," is noteworthy. In a recent test before a woman of considerable musical training he played the *Anvil Chorus* from "Il Trovatore," *Lohengrin*, the Tannhauser *March*, *Tarantella*, *Carmen*, Chopin's *Funeral March* and many other classics. He read at sight the *Marche*

Grotesque by Sinding, Chaminade's *The Flatterer*, and *Heart's Melody* by Engelman. He then accompanied the phonograph in playing *Humoresque* and the *Blue Danube Waltz*, and had no difficulty in selecting the right key. He also read at sight the accompaniment for a vocal soloist. His emotional instability obviously has an unfortunate effect upon his playing, but he plays accurately and with feeling when his attention is focused upon his music rather than upon the admiration he is exciting. The music instructor at the institution considers his technique very fine for his limited period of study. His pitch discrimination is remarkable, and his tonal memory unusually good. His sense of rhythm seems to be more affected by his emotional state than are his other abilities, and consequently is more variable. The most important single factor in the boy's talent seems to be his memory. For time, for places, for events, for any composition ever learned, he has a memory almost phenomenal. That he has kinaesthetic memory also, is evidenced by his habit of playing without looking at the piano. His ability to imitate is considerably beyond his mental age. In the Knox cube test he made no failures.

Unfortunately, this patient is deteriorating mentally. On his admission to the institution in 1914, age fourteen years, his intelligence quotient was .62, at twenty years of age, his I. Q. was .54 (mental age eight years and six months) and a recent test gave him an I. Q. of .46 (mental age seven years and five months) by the Stanford Revision of the Binet-Simon. In this last test his basal year was four. At the five year level he failed the "patience" test, and in the sixth year passed all but the mutilated pictures. At the seventh year he failed to give differences and received only half credit for tying the bow. At eight years he failed the ball and field and the comprehension tests, and could not count backwards. At nine he knew the date, could make change and give rhymes. The subject failed all tests at the ten year level. The greatest deterioration appears to be in comprehension and judgment. At present he seems to fall at about the six year level in tests of these functions. In Burt's reasoning tests he made a score of 1.75, giving him a rating just below the seven year level. His score in the Indiana University Primer scale was 42, (the median for six years is 43.3). He was unable to go above the fifth year in the Porteus Maze tests.

Emotionally, this boy is excitable, egocentric, usually cheerful and obedient, but very sensitive and wholly incapable of a social existence. He does not mix with the other boys, and leads a life really apart from them, although one feels that he craves comrade-

ship, but does not know how to get it.

There are two particularly interesting features of his talent. One is his failure to produce any original composition. This may be the result of defective intelligence. The other is his inability to learn to dance. He seems to have no comprehension of the relation of the musical rhythm to his own movements. This apparently is not dependent on intelligence, for many low grade defectives are excellent dancers.

The study of this case is by no means a complete one but it serves as one more bit of evidence that musical ability is a thing apart from "general intelligence." It is interesting that the disease which robbed the child of his heritage of intelligence and increased his emotional instability, left apparently intact this special talent. It is perhaps purely a matter of chance that he was left with one intellectual trait, his unusual memory, unimpaired. This fortunate combination of memory, sense of rythm, pitch discrimination, etc., makes a striking talent. Were any one of these lacking, or destroyed, the whole gift would go with it.

THE FRANZ DOT TAPPING TEST AS A MEASURE OF ATTENTION[1]

By Irene Case Sherman

In his "Handbook of Mental Examination Methods"[2] Dr. Franz describes various tests of attention, among them a test of the performance of accurate movements. Cross section paper (2 or 4 squares to the inch) is used; "The subject is instructed to tap in each square as rapidly as possible, going to and fro."[3] The experimenter notes the time for the taps along the particular lines. The test may be made with 300 squares, 20 squares to the line. Emphasis is placed neither upon accuracy nor upon speed, since the aim is to discover variations in attention.

In a personal communication Dr. Franz advised the use of 10 squares to the line with 30 lines for children. He states that the individual sets his own speed, but is expected to keep up the same speed throughout the test. With a speed not the maximum the rate can be kept up constantly with a variation of not more than 10%. He believes that the test shows ability to keep up progressive work, and also indicates "stick-to-it-ness." He also points out that the test shows the relative performance of the individual at different times, and does not give a comparison of different individuals.

In an effort to find an accurate means of measuring fluctuations of attention in children, this test, with a number of so-called attention tests, was given to 172 unselected cases[4]. Cross section paper four squares to the inch was used, with ten squares to a row in a series of thirty rows. The instructions to the child were, "Put a dot in each of these squares, beginning here and going across to here (examiner indicated the distance of the ten squares), then coming back on the next row, and so on down to this line (indicating the base line which marked off the thirty rows). Do this as fast as you can, but be sure to put a dot in each square, and don't miss any squares." The time for completing each row of squares was taken.

The results indicated such a wide variability of performance in children that it was felt to be necessary to establish a more accurate norm than the 10% variability suggested by Dr. Franz,

[1]Dr. Franz does not name this test, but the writer feels "Dot Tapping" is most descriptive of it.
[2]Franz, Shepherd Ivory, *Handbook of Mental Examination Methods.* The MacMillan Company, 1920.
[3]Ibid. P. 80.
[4]Institute for Juvenile Research, Chicago, Illinois.

provided the results would lend themselves to such a standardization.

Each child was graded by the Stanford Revision of the Binet test, so that a mental age and intelligence quotient was available in each case. In each case the arithmetic mean, the range and the average deviation of time were taken, as well as the coefficient of variability. In order to discover the influence of age, mental age and intelligence rating upon performance in the test, the results are arranged according to these three factors, and are presented in tables I, II and III.

Table I indicates that there is a general decrease in average time, average range and average deviation with increase in chronological age. This decrease, however is not sufficiently regular to make the chronological age a basis of standardization of performance, and is no doubt due to the increase in speed due to better motor co-ordination which develops in advance in age. The coefficient of variability showed an even greater variability in

TABLE I

RESULTS ACCORDING TO CHRONOLOGICAL AGE

Age	Average Time	Average Range	Average Deviation	Coefficient of Variability	No. of Cases
7–0	11.27	13.9	2.26	19	9
8–0	12.78	8.9	1.65	14	7
9–0	7.85	7.2	1.37	18	15
10–0	6.84	6.6	1.17	16	20
11–0	6.72	6.1	.98	13.5	19
12–0	5.62	4.9	.92	16	21
13–0	5.65	5.1	.99	17	23
14–0	3.96	3.4	.5	12	26
15–0	5.16	3.6	.70	11.68	15
16 +	5.11	3.7	.77	15	17
TOTAL					172

relation to age, so that it indicates no relation between variability and chronological age.

Table II shows the same tendency for average time to decrease with increasing mental age, the average range and average deviation also show this decrease, but not to such a marked extent as average time does. While this decrease in average time is quite definite, yet the differences between any two mental ages are too small to make the average time a basis of scoring in terms of mental age. The coefficient of variability, as in the case of chronological

age, shows great variation, and no relation to mental age.

Table III indicates that none of the measures showed any relation to intelligence quotient.

Table IV and graph 1 give the distribution of the coefficients of variation for the entire number of cases. The median coefficient is 14.75 and the inter-quartile ranges from 11 to 18 inclusive. That is, fifty per cent of our cases have a coefficient of variation between 11 and 18. A score falling between these numbers, then, indicates a normal performance in this test. The upper quartile ranges from one through ten, and any score between these numbers would be considered an excellent performance in this test. A score of nineteen or above is considered to show a fluctuation of attention greater than that shown by fifty percent of our cases.

Graphs 2, 3 and 4 illustrate the increased variability of performance of individuals with a coefficient of variability above 18. The time is more variable in subjects with a high coefficient, and they

TABLE II

RESULTS ACCORDING TO MENTAL AGE

Age	Average Time	Average Range	Average Deviation	Coefficient of Variability	No. of Cases
5–0	9.17	6.0	1.16	13	1
6–0	13.52	10.3	1.98	15	11
7–0	10.45	13.7	3.17	23	16
8–0	6.97	5.2	1.01	14	26
9–0	6.31	5.3	.97	15	28
10–0	5.42	5.5	.89	16	32
11–0	4.56	3.0	.63	14	14
12–0	4.85	3.3	.67	14	15
13–0	4.09	2.6	.43	11	14
14–0	4.03	2.8	.43	10	7
15–0	4.95	4.1	.89	17	4
16+	3.55	2.0	.34	10	4
TOTAL					172

TABLE III

RESULTS ACCORDING TO INTELLIGENCE QUOTIENT

I.Q.	Average Time	Average Range	Average Deviation	Coefficient of Variability	No. of Cases
50	7.0	5.9	1.5	15	9
60	7.1	6.5	1.3	17	23
70	6.6	5.4	1.0	16	41
80	8.4	6.8	1.2	14	43
90	6.3	7.4	1.2	16	26
100	5.0	3.5	.6	11	20
110+	4.9	4.0	.7	12	10
TOTAL					172

TABLE IV

DISTRIBUTION OF COEFFICIENTS OF VARIABILITY—172 CASES

	0- 1	1
	1- 2	1
	2- 3	2
	3- 4	1
	4- 5	2
	5- 6	3
	6- 7	5
	7- 8	8
	8- 9	5
	9-10	12
25 percentile	10-11	16
	11-12	12
	12-13	12
Median	13-14	13
	14-15	8
	15-16	8
	16-17	12
75 percentile	17-18	13
	18-19	7
	19-20	9
	20-21	5
	21-22	3
	22-23	0
	23-24	3
	24-25	3
	25-26	3
	26-27	0
	27-28	1
	28-29	0
	29-30	2
	30-31	0
	31-32	0
	32-33	0
	33-34	0
	34-35	0
	35-36	0
	36-37	1
	37-38	0
	38-39	0
	39-40	0
	40-41	1
		172

require on the whole a greater length of time to complete the test than subjects with average coefficients. This difference is more marked in the case of the average deviation, where the measures are greatly dispersed for those coefficients above 19, while those below 18 show a central tendency around a low average deviation. The mode for those making an excellent score (3–10) is .1 while the mode for the average group is somewhat higher, namely .7. The range of time taken on the test is

also higher for those with coefficients above 18, being more widely distributed than the measures for the lower coefficients, which as in the case of average deviation, show a marked central tendency around a low score. These graphs clearly show that a high coefficient of variability is accompanied by increased total time of performance, increased range of time from line to line, and increased deviation from line to line. Since it has been shown above that the coefficient of variability is independent of age, mental age and intelligence quotient, it may be assumed that the variability of the coefficient is due to some other factor, presumably fluctuations of the attention.

Graph 5 illustrates the typical kinds of performance on this test. The first curve has a coefficient of variability of 4, which is superior performance. The average time is five seconds, with long periods of no variation from this average time; there are no great deviations from the average from line to line, and the total range of time is only two seconds. The second curve is that of an average performance, with a coefficient of variability of 14. The average time is also five seconds, but there are no long periods of unvaried performance, although on the whole the deviations are slight. The total range of time, however, is five seconds. Curve three is a curve typical of a high coefficient of variability, in this case 20. The average time here is 13 seconds, with no periods of invariable performance. There are constant deviations from the average from line to line, with a wide total range of time, namely, 15 seconds.

In the giving of the tests it was often noticed by the examiner that children frequently varied the size of the dot, began making circles, heavy dots, two dots in one square, etc. This was often interpreted as due to low chronological or mental age, or to low general intelligence. Since the results showed no relation between these factors and the coefficient of variability, a study of the dot patterns was made. This revealed that the variability of the size of the dots had little relation to the score. Subjects who changed from a large dot to a small dot, or vice versa, did not necessarily make a poor score. In fact, many changes in the size of the dots occurred with no change in time from line to line. On the other hand, many subjects who made very poor scores showed a marked regularity in the size of dot. In only one case was there a definite relation between size of dot and increased time. This case, scoring 18, had a marked increase in time in two lines, with a change in dots in these lines, making circles instead of dots in these two instances. On the other hand, of six cases showing lines with marked increase of

time with increase in size of some of the dots in this line, all of these cases also had other lines with increased rate of time and no change in size of dots or other variations. While it is possible that a change in the size of the dot may mean a shift of attention, it is almost inpossible to say definitely that this is true, because of the large number of cases in which there was no evident relation between time and size of dot. Changes of time are just as likely to occur where there are no changes in size of dot as where there are such changes, and on the whole these changes in size of dot are considered as insignificant compared with other unknown factors which are producing changes in attention. In fact, it is believed that these changes in size of dot are but one of the external manifestations of the variability of attention, relatively unimportant, since they seem to influence the total score very little.

The records of the cases were analyzed in order to discover, if possible, any factors in the subject which might cause, or be correlated with unstable attention. Because of the subjective nature of the analysis of the individual cases, with the marked lack of correspondence of descriptive terms used in the various records in presenting the history and mental analysis, a limited number of terms were arbitrarily selected as possibly having some relation to attention. In cases designated as negative none of these descriptive terms occurred.

In Table VI the individuals are classified under the descriptive term which most nearly described them; the percentage distribution is given according to coefficients of variability. The table shows that the smallest percentage of individuals with a negative history occurs in the group with scores of 19 or above. This same group also showed a larger percentage of "irritability," "distractibility," "incoherence," and marked "slowness of reaction" than did the other two groups. Subjects described merely as nervous and restless were found not to show poor attention as measured by this test. It was also striking that individuals described as being poor in attention by various examiners or other observers in the home or school were not characterized by making an unusually high score, i. e., 5% of these subjects made coefficients from 3 to 10, and likewise 5% made coefficients of 19 or above. Similarly, subjects with organic brain disease or psychoses were not characterized by a high score. Rather, the larger percentage of these were found to make an excellent score, namely 3 to 10, and were able to sustain attention over a short period of time, such as is demanded in this test.

TABLE VI

PERCENTAGE DISTRIBUTION OF TYPE OF CASE, ACCORDING TO COEFFICIENT OF VARIABILITY

Coefficient of Variability	Negative	Poor Attention	Nervous and Restless	Unstable	Irritable	Hyperactive, Distractible and Flighty
3-10	42.1%	5.3	18.4	7.9	2.6	2.60
11-18	49.5%	3.2	9.5	1.0	9.5	3.21
19 +	28.2%	5.0	12.8	7.7	12.8	7.70

Coefficient of Variability	Rambling and Incoherent	Slow	Apathetic	Psychotic	No record	Total
3-10	2.6	2.6	5.3	7.9	2.6	99.9
11-18	0	0	12.6	2.1	8.4	100.0
19 +	5.1	7.7	5.1	2.6	5.1	99.9

CONCLUSION

While average time, range and deviation decrease with increasing chronological and mental age, this decrease is not sufficient to make chronological or mental age a basis of standardization, since the increase is probably due purely to increasing motor coordination which develops with increasing maturity. The better performance with increasing age, then, is not due to better controlled attention, since the variability of performance as measured by the coefficient of variability shows no relation to age.

There is no relation between performance in this test and intelligence quotient. Variability on the test is due to some factor other than maturity or general intelligence, presumably fluctuation of attention.

The inter-quartile range of coefficients of variability for this group of 172 unselected cases was 11–18. A score within this range is considered average performance.

A high coefficient of variability is accompanied by increasing total time of performance, increasing range of time, and increasing deviation.

Among cases showing a high degree of variability (score of 19+) there was a greater percentage found to be "irritable," "distractible," "incoherent" and "slow in reaction." Subjects described merely as "nervous and restless" were found not to show poor attention as measured by this test. Performance on the test showed that children described by observers in the home or school as inattentive did not necessarily make poor scores on this test. Observed inattention in these cases is evidently not a real lack of ability to attend, but is expressive of some other factors.

Similar results were reported in a recent article[5] on post-encephalitic children, where it was found that, although these cases were described by observers as inattentive, by tests they proved capable of sustained attention. The writers concluded that in their cases the apparent inattentiveness was the result of emotional disturbances[6].

[5]Sherman and Beverly. *The Factor of Deterioration in Children Showing Behavior Difficulties Following Epidemic Encephalitis.* Arch. of Neur. & Psych., 1925, Vol. 10, pp. 329-340.

[6]The writer is indebted to Myrtle Raymaker Worthington for assistance in preparation of the data.

AN ADVANCED COURSE IN EXPERIMENTAL PSYCHOLOGY APPLIED TO ADVERTISING*

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It is obvious that the teaching of advertising without an experimental laboratory is just as futile as teaching civil engineering without a field course in surveying. However, there is a vital difference between the two: in the latter case an engineering student can check up the correctness of his surveying with the aid of mathematical computation; while in the case of psychology as applied to advertising the student, at the present, cannot verify his theories except by reference to a purchasing public to which he has usually no access. Nevertheless it is perhaps possible to bring this contact about—between the student of advertising and the purchasing public—by a cooperative plan on the part of the advertiser and the university.

Obviously a student who would profit by such a cooperative arrangement cannot be a beginner in the field. It is vital that he should have some knowledge of the fundamentals of advertising before he is admitted to such a course. It has been our policy to make the following prerequisites for the course in experimental advertising: one semester of general elementary psychology, one in marketing, and another semester in psychology as applied to advertising. We are hoping that, in the last-named course, the student will become familiar with the application of psychological principles to the general field of advertising. To accomplish this end, the student is asked not only to read published material and listen to any new ideas brought out in the lectures, but also, as part of his home work, to criticise advertisements, select samples of advertising illustrating good and bad applications of psychological principles, or lack of application, discover modern tendencies and solve any problems which were formulated by the instructor for the purpose of applying psychological principles to advertising. Some of these problems were of the following nature: one such problem was as follows—Explain why advertising is limited to the use of only two of the four possible ways of producing attention. Illustrate. For the second example take the case of an Illinois farmer who wishes to advertise in the weekly news-

*Read before the annual meeting of The National Association of Teachers of Advertising meeting with The Associated Advertising Clubs of the World, Atlantic City, June 6, 1923.

papers in order to market by express some new potatoes direct to the consumer. Three good papers are available, each covering different territory. A full page of space in any of them would cost fifty dollars, smaller space in proportion. How can the farmer most profitably spend fifty dollars in advertising in a given week? Why? Here is still another problem—An advertising man lost his job, the reason being that he arranged for an advertisement to appear every other month in a monthly magazine. The excuse he gave was that the appropriation was limited to the cost of only six issues. Why did this advertising man get the worst of it?

When a student has successfully completed this comparatively elementary course in advertising he can, in his senior year, or while pursuing graduate studies, elect the advanced course in experimental psychology applied to advertising. He can pursue this course either one or two semesters, gaining academic credit proportionately to the work done, but not exceeding five credit hours during any one semester. The students in this course meet twice a week in one hour sessions for discussion and twice a week in three hour sessions for laboratory practice.

The course itself is divided into two parts—individual problems and class problems. The first part—individual problems—is divided further into two parts, the division being based on the individual ability of the students in the group. The more promising students are assigned problems of minor research, individually or in groups, while the less capable students are assigned to perform standard laboratory experiments. For example, the following two are some of the problems of minor research assigned to the more capable students:—the first of these is an experimental study of the relative persuasiveness of types of advertising. Fifty types of advertising appeals were tried upon twelve hundred day and night school students. The second problem was a study of the legibility of printing types as classified in groups with relation to their feeling tone. The less capable students were instructed to duplicate some of the well known experiments in the field of the psychology of advertising devised by such men as Scott, Gale, Hollingworth, and Strong.

The second part of the course, required of all students, aims to supply the need of an actual contact with the buying public, and also attempts to bring before the students *practical* problems of advertising. In this, the *applied* part of the course, the students were concerned with the actual field problems in advertising. While it is, *strictly* speaking, impossible to separate the actual business part of advertising from the application of psychological

principles to advertising, *practically* at least, that can be done in a measure. The reason for such an arbitrary division, into the business and the psychological aspects of advertising, is that a course in psychology cannot teach the student how to run the business as a whole but only how to apply psychological principles to certain aspects of it.

The success of this applied part of the course depends upon the ability of the instructor in charge, or the university as his agent, to obtain the good will and cooperation of two important groups: first, small scale advertisers; second, a group of representative professional advertising men. The vicinity of the university to a large industrial city, while not absolutely essential, lends itself splendidly to this purpose.

Again in this *applied* part of the course the class helps to determine the nature and function of the advertising which is submitted for its judgment by the small scale advertiser. In that way the class has the opportunity to verify its experiments and the validity of its claims for the application of psychological categories to the advertising of merchandise, just as much, as the engineering student is able to verify his surveying data mathematically. In order not to go far wrong in the decisions of the class, and in this way waste time and money for its clients, the problems before the class and their decisions are discussed by the instructor from time to time with the above-mentioned advisory board composed of professional advertising men of high standing, chosen in such a way that they as a group represent the various types of advertising agencies now in existence.

It is important to understand that the students in experimental advertising are not expected to represent artistically their ideas in the making of the usual cut and copy. That is done for them and upon their bidding by professional artists and copy writers. It is not the function of this class, or any other in the field of psychology as applied to advertising, to teach the technique of carrying out ideas in the form of cut and copy. The function must always lie with the schools of art and expression, and only with those students who possess such a capacity.

For the sake of clearness it may be expedient to state some of the field problems which made up the task for the class:

First. A local storage and transfer company asked the class to consider its advertising problem, especially during the months of April and May, September and October.

Second. A Chicago advertising agency requested the class to

suggest the method and the nature of the copy to be used in order to put before the public a new type of baby carriage.

Third. A large manufacturer of paint asked the class, through his Chicago advertising agent, to prepare for his use a pamphlet of information about the nature and utility of his merchandise, to be distributed by mail, coupon attached.

Fourth. A manufacturer of garters requested the class to judge a secondary slogan with reference to its effect upon the potential buyer, and if necessary to construct a new slogan more suitable for its purpose.

This is by no means the only method that can be used to teach that sort of course, but it is a method, we believe, that has had a certain degree of success. The primary purpose of this paper, however, is to stimulate a vigorous discussion of the subject it presents.

MEASURING THE COMPREHENSION OF ADVERTISEMENTS

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One of the most fundamental rules of a writer or a speaker is chat he shall "come down to" or not go "over the heads of his audience." The speaker may get an immediate reaction from his audience that will tell him whether or not he is obeying this rule. The writer, and especially the advertising copy writer, may not always be so fortunate. His returns from any one piece or series of pieces of copy may be extremely slow and indirect. Where every word costs many dollars, it is extremely important that each shall carry a message that will pay for itself and also bring a profit. To be sure, pictures will do much to carry the message, and may at the same time hide the unintelligiblity of the copy. But even motion pictures require some easily comprehended copy to make them acceptable.

Advertising, particularly national advertising, is mass selling and to be effective must appeal to the bulk of the public. It is not easy to know the ability of this vast public to comprehend the printed message. In fact, no one seems to have even guessed at the level of intelligence, so called, of the white population of the United States until the results of the Army intelligence tests were reported. The percentage of illiteracy has received the most attention, altho the much larger percentage of low degree of literacy is quite as important. We need not here concern ourselves with the heated discussions as to whether the average adult has an intelligence of a thirteen, fourteen or sixteen year-old person. Most of these discussions center around the question whether printed symbols are adequate material for measuring native intelligence. We are here concerned with the capacity of the population to get the meaning of printed symbols, and with the degree to which the advertising copy-writer keeps within the limits set by the capacity of the average person.

Now the average adult can read, understand and deal with printed symbols about as well as the 14 year old child, or one who has completed the elementary schools grades. It is to an audience of no higher type than this, about one half of the country's population, that the advertiser of generally used commodities

must appeal. That is, this degree of capacity sets the limit beyond which the copy-writer should not go.

1. To what degree does the copy-writer adjust his vocabulary to his audience?

With our little knowledge of the make-up of the advertiser's audience, complicated by the shifting of maximum buying power from the professional classes to the laboring classes, it is not safe to cling to an untested opinion on this matter. Moreover, it is a question which lends itself readily to experimental measurement. It one wants to know whether his copy is intelligible to his audience let him try it on a sampling of that audience. The following studies are intended to show whether or not such tests are necessary and at the same time to show how they may be made.

All the words, excluding the names of articles, were gathered from 190 advertisements appearing in one issue of the "Saturday Evening Post," "The Ladies' Home Journal" and the "Woman's Home Companion." There were in all 6378 words and when all repetitions of various sorts were eliminated, there remained 3796 different words. This list of words was checked against the words appearing in the "Teachers Word Book," prepared by E. L. Thorndike. This is an alphabetical list of the 10,000 words occurring most commonly in a count of about 625,000 words from literature for children and forty other sources. Of our list collected from the advertisements, only 4 percent failed to appear in the "Teachers Word Book." The copy-writer therefore, seems to keep fairly well within *these* limits.

Fifteen of the words appearing in both lists were chosen at random and presented to 37 persons, none of whom had gone through High School, who were asked to give their meaning. The percent of errors for the different words including no answers and wrong answers, ranged all the way from 2.7 percent for the word "reputation" to 73 percent for the word "zest." The average percent of error was 12 percent. Six words appearing in the advertisement word list but not in the "Teachers Word Book" list were now tried on the same 37 people. The percent of errors ranged from 0 for "parasite" to 60 percent for "slush." Although 37 people of elementary school grade do not form an adequate sample of any one class of the population, these figures suggest that even such a word list as that in the "Teachers Word Book" would not be an adequate guide for the copy-writer to follow if he is to be certain of understanding on the part of his audience. The percent of error was just as great for words appearing in the list as for those which were not in the list.

The following experiment with an actual advertisement showed

the effect of the poor adjustment of an advertisement's vocabulary to its audience. An advertisement of the poster type for Premium Ham contained the following statement: "An Epicure's Way of Baking Ham." The whole appeal lay in the meaning and connotation of the word "epicure" and must have been intended to produce a favorable reaction in the lower half as well as the upper half of the population.

Another advertisement was prepared, duplicating this one in every respect except that the word "Igorot" was substituted for the word "epicure." These two advertisements were shown to each of 53 housewives with the requests that they state which way of baking ham seemed to them the more desirable. Twenty nine chose the "epicure" advertisement while 24 chose the "Igorot" advertisement, indicating that they preferred to bake their ham the savage way. Since it appeared quite likely that some of the 29 who chose correctly may have been only guessing, they were asked to give their idea of an eqicure. Seventeen of them showed that they had sufficient knowledge to make a correct choice, while the other 12 acknowledged that they knew the meaning of neither word and had no particular reason for their choice. They had chosen one merely to comply with the investigator's request. Sixty eight percent of this sample group had failed to get the meaning which was intended. Although the illustration carried the atmosphere of a very pleasing food and made the advertisement a good one, another more readily understood word would certainly have added much to its effectiveness.

2 To what degree does the copy-writer adjust his ideas to his audience?

It is quite evident that a person may understand every word in a sentence and yet not get the meaning conveyed by the sentence as a whole, may not get the idea in the mind of the writer. To determine the degree to which the ideas presented in an advertisement are grasped by the public a series of tests was conducted. These tests took the form of the Thorndike Reading Tests which are designed to measure the degree to which one understands what he reads. A passage is presented to be read along with a series of questions to be answered from the material read. In our tests an advertisement in its complete form together with a series of questions was used, or the copy of the advertisement was presented in typewritten form together with a series of questions bearing upon it. Nineteen sets of material representing different advertisements were tested on more than 1,000 people. The advertisements ranged in character from the simple Subway Car card to the elaborate automobile advertisements. As it is impos-

sible to present the data for all the advertisements in sufficiently brief space, samples will be chosen to illustrate the method and the nature of the results.

One hundred and seven New York Subway passengers were asked to read the advertising card for the ..... Emulsion which contained the following copy:

"Milk is an emulsion. The ..... Emulsion is emulsified 550 times finer than milk and its fat content is eight times richer than the best milk. That is why physicians and druggists all over America, when asked to name the finest emulsion, answer The ..... Emulsion. Tastes good—No Cod Liver Oil-Protects and Builds Health."

The following questions were asked and the answers recorded by the investigator:

1. What is an emulsion?
2. What does "emulsified 550 times finer than milk" mean to you?
3. What is it that makes milk an emulsion?
4. Why does the ..... Emulsion protect and build health?

The answers to questions 1 and 3 demonstrated that none knew the essential characteristics of an emulsion, altho 46 percent knew that an emulsion was fatty. To others it was merely a liquid and to still others it was merely white. Answers to question two showed that none grasped the significance of the statement. About 30 percent did say that it meant that the ..... Emulsion is 550 times better than milk. Although this belief is misleading it is not damaging to the product. Sixty-four percent believed that this emulsion would protect and build health, because "it is better than milk" (24 percent) or because "it is recommended by physicians and druggists" (40 percent). Although this advertisement may be considered effective, there is a great question whether the copy-writer really "put his ideas over," and obtained the maximum effect possible.

Forty seven women, all of whom looked like housewives, were asked to read the following car card, which is of the simple publicity sort:

"..... Golden Syrup. Made from Cane Sugar. For Table-For Cooking."

The questions asked were:

1. Why should you buy a can of ..... Syrup?
2. Why does cane sugar make good syrup?
3. What other kind of sugar could be used to make syrup?

To question one, eighty percent said they would buy it because it was made from cane sugar. This was, of course, the only selling

argument presented in the advertisement. But in answer to the second question it was discovered that no one knew why cane sugar would make good syrup. The answers to question 3 showed that 70 percent knew of no other kind of sugar from which syrup might be made. Further questioning of those who said they would buy this product showed that it was the prestige of the trade name that was effective, and that the only actual reason given for buying this product had not done its work. .

Following is the copy taken from an automobile advertisement and presented to 55 college men with the request that they read it and answer one question about it.

"Humanity may be a million years old in point of time, but it is as young as this morning's sun in its pursuit of the ideal. After two thousand years of disappointment and disillusion, the eternal verities and the eternal values still prevail ..... Even though it be surrounded and seemingly obscured by sham and pretense, nothing in this world is discovered so surely as solid merit ..... This is the truth that embodies all truth; this is the truth that makes men free."

Thirty percent of the group could not answer the question which was: What is the truth that embodies all truth? As they did not discover that "nothing in this world is discovered so surely as solid merit," they could see no connection between this paragraph and an automobile advertisement. One person who had had experience in copy-writing agreed that "it might be part of a poor advertisement for a good automobile." It seemed useless to try this paragraph on less intelligent groups of people, who at the same time might represent better automobile prospects than the group used in our experiment.

This paragraph was difficult or impossible to understand because of its abstract ideas and the complicated character of its construction. Another case studied, that of a doube-page advertisement for a new safety razor owed its difficulty to the wealth of technical details involving a greater knowledge of physics than is possessed by the majority of people, even of college students who have had the advantage of a course in physics. The actual advertisement was used in this experiment and its content is too long to reproduce in this connection. It is described in some detail in another article by the author[1]. All that need be mentioned here is that of the 55 college students who were asked to answer a series of 7 questions about this advertisement, with the privilege of consulting it as often as desired, practically none was able to

[1]A. T. Poffenberger, Journal of Applied Psychology, 1923.

grasp the technical details on which the success of the product depended.

The study of the nineteen cases, of which those given are samples, shows that advertising copy both in the vocabulary used and in the nature of the ideas presented frequently "goes over the heads of its audience." The trouble is frequently hidden in one or other of two ways or both. First, the excellence of the illustration may overcome the shortcomings of the copy or make the advertisement successful in spite of the copy. That copy can convey the most abstruse ideas so that they shall be easily understood, the reading of the masterpieces of literature will show. Second, people may be convinced of the value of an article even when they do not understand what is said about it. But since we do not know the extent to which this sort of reaction prevails in human behavior it does not seem safe to rely on it for successful advertising. It is a matter, however, which the student of Applied Psychology might well investigate.

The unfailing remedy for suspected unintelligible copy or copy that is difficult to understand is, as suggested in the beginning of this paper, a very simple one. It is, "Try it on the audience." Take a sampling of that portion of the public to whom the copy is to appeal and by a series of questions, carefully prepared beforehand, find out just what is the reaction to the copy. The Applied Psychologist who is interested in measuring and predicting human behavior in cases of this sort relies upon no general principles to guide him, but resorts to the method of sampling just as the chemical engineer or the physical engineer tests his materials by the method of sampling. And just as in these latter cases, skill is required in obtaining the samples, in measuring them, and in drawing conclusions from the measurements.

The advice of Robert Louis Stevenson to "Write so that the fool can understand you, and the wise man will understand you also," is, indeed, good, provided that one takes pains to discover what the fool can understand.

NEWS AND NOTES

The increased appropriation voted by the Eighty-fifth General Assembly of Ohio to the Bureau of Special Education and Psycho-Educational Clinic of Miami University, has enabled the Bureau to increase its staff, to enlarge its facilities for training teachers and supervisors for special classes for subnormals, delinquents and speech defectives, and psychological examiners, and to open a branch station in Cleveland. In addition to the director, J. E. W. Wallin, the staff includes the following: in the Dayton center, Mrs. Jessie Wilson, M. A., University of Michigan, and Miss Janet Holcomb, M. A., Columbia University; Psychological examiners and instructors, Miss Mildred Grimes, B. A., Western Reserve and graduate student at Columbia, instructor in industrial arts, critic teacher and Miss Eva Nutting, student in the Bureau of Special Education, Miami University, critic teacher; and in the Cleveland branch, Bertha M. Luckey, Ph. D., University of Nebraska, and Treva Witherstay, critic teacher.

Students are admitted from all sections of the country without other charges than a nominal registration fee.

SPECIAL EDUCATION, OHIO UNIVERSITY, ATHENS, OHIO

The work in Special Education was established in the College of Education of Ohio University, Athens, Ohio, in 1920 in connection with the Department of Psychology and Paidology. In the fall of 1922 this work in Special Education was made a separate part of the Training School in order to take care of the Special Classes in the City Schools of Athens as well as to meet the calls coming from the students desiring practice in schools for exceptional children. Miss M. La Vinia Warner, graduate of Columbia University, New York City, is directing the new department.

Special facilities were already afforded by Ohio University for the preparation of teachers for this line of work because of the opportunity for the selection of subjects offered by the College of Education and also the College of Liberal Arts to which are now added the Special subjects further needed and the Special School for exceptional children as a training school. The need for special education in the public schools of Athens and Athens County affords a wonderful opportunity for the study of all types of exceptional children and the social conditions give students a good opportunity for the study of and practical experience in Social Work.

A group of fourteen students registered for the work in Special Education in the 1922-23 term and thirty-seven students came in for the Summer Session of 1923. The demand for the work is

growing rapidly throughout the State of Ohio and more calls than can be filled are coming in for teachers trained in this field.

W. V. Bingham has been elected Editor and L. L. Thurstone Associate Editor of the Journal of Personnel Research. C. S. Yoakum continues as Managing Editor of the Journal which is now entering on its second volume. The other members of the editorial board are Wesley C. Mitchell, Alice Hamilton, Frankwood E. Williams, R. W. Husband, Matthew Woll, Leonard Outhwaite, Joseph K. Willets, Lewis M. Terman, Alfred D. Flinn and Mary Van Kleek.

This Journal is devoted to the scientific study of personnel. It publishes original researches in the applied sciences that contribute to our knowledge and our effective direction of people at work. It is the official organ of the Personnel Research Federation whose purpose is the furtherance of research activities pertaining to personnel in industry, commerce, education and government wherever such researches are conducted in the spirit and with the methods of science. It brings together workers in the biological and medical sciences, psychologists, psychiatrists, engineers and economists who are making significant contributions to more exact knowledge of human beings at work and methods of making effective and satisfying adjustments between men and their work.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

TORONTO MEETING, AUGUST 6TH TO 13TH, 1924.

SECTION J (PSYCHOLOGY)

Dear Sir (or Madam),

A meeting of the British Association for the Advancement of Science will be held at Toronto, from August 6th to 13th, 1924.

The association has recently added to its various Sections a Section of Psychology. The Organising Committee of the Psychological Section believes that the meeting will afford an unique opportunity for intercourse between psychologists of Canada, the United States, and Great Britain; and accordingly issues an invitation to any psychologist in the United States or Canada, who may desire to do so, to join the Association as a member for the Meeting, and to contribute a paper or attend the discussions.

Professor McDougall, F.R.S., of Harvard University, has accepted appointment as President of the Section; and it is hoped that he will deliver the presidential address.. Other papers have been promised by Dr. Morton Prince, Dr. Brett, Dr. Bott, Dr. Bridges, Dr. Sandford, Dr. Tait, by Dr. Myers, Dr. Burt, Dr. Drever, Mr. Flügel, Dr. Miles, Professor Pear, and other leading American and British psychologists.

Joint Meetings have been arranged with the following Sections:—

Section H (Anthropology) to discuss "Racial Mental Differences."

Section I (Physiology) to discuss "Application of Physiology and Psychology to Industrial Efficiency."

Section L (Education) to discuss "Tests for Scholarships and Promotion."

Papers should not require more than 20-30 minutes to read; and intending contributors should send a notice of their papers before the end of March to the Recorder of the Psychological Section (British Association), The Psychological Laboratory, The University, Leeds, England. Further particulars as to membership for the meeting can be had from the Secretary, British Association, Burlington House, Piccadilly, London, W.1., England; and notices of the general arrangement will be issued in due course by him and by the Hon. Local Secretary in Toronto.

We are,

Yours faithfully,

LL. WYNN JONES, Recorder,
CYRIL BURT, President (1923)
W. McDOUGALL, President (1924).

BOOK REVEIWS

ALBERT S. OSBORNE, *The Problem of Proof*, pp. xxii + 526. Matthew Bender & Co., New York and Albany, 1922.

Students of legal psychology should have access to this volume by the distinguished author of "Questioned Documents." Mr. Osborn has been a close student of human nature, especially as he has observed it in trial lawyers, judges, jurors, witness, litigants, and criminals. He understands perception and memory, reasoning and emotion, suggestion and persuasion, credulity and deceit; and he has here put down the rich accumulations of his wisdom for the guidance of trial attorneys and the furtherance of justice.

Of the twenty-eight chapters, the psychologist will especially enjoy these: Sifting the Evidence, The Atmosphere of a trial, Cross-Examination, Memory and the Proof of Facts, Advocacy, Persuasion and Practical Psychology in Courts of Law, Form Blindness, The Designing and Lighting of Court Rooms, and The Judge in Disputed Document Trials. The vocational counsellor and the prospective attorney should read, beginning on page 234, Mr. Osborn's description of the requirements of the great lawyer.

Carnegie Institute of Technology. W. V. BINGHAM

HELEN T. WOOLLEY and ELIZABETH FARRIS, *Diagnosis and Treatment of Young School Failures*, Bulletin 1923, No. 1, p. 115, 10 cents. Department of Interior, Bureau of Education, Washington, D. C.

Both the teacher and the psychologist will appreciate this picture of what may be accomplished with young school failures. Various mental and educational tests were used in selecting the sixteen children for the "demonstration class." The children in the class varied in chronological age from six years and seven months to ten years and four months, and the intelligence quotients of the first test varied from seventy-five to ninety-five.

The children were grouped for study into four dominant causes of their difficulties, as neglected children; high-grade defectives; special defects in some one subject; and psychopathic children. Each type is reported in the bulletin separately and each case is very completely reported, giving many helpful points in understanding such children.

The entire article is a plea for proper treatment and classification of exceptional children. One of the best arguments for Special Education that is shown in the bulletin is found in the discussion of the changed attitude of the children towards school and life. This is certainly worthy of consideration. Another is that the intelligence quotients of these children increased with the superior teaching.

Ohio University. M. LA VINIA WARNER

BERNARD C. EWER, *Applied Pschology* pp. xii+480. Macmillan Co., N. Y. 1923.

Psychology must be saved from her friends. Like many another well-favored jade of popular acclaim, she is in danger of having her name become a by-word and a term of reproach to be thrown in the teeth of her too much preoccupied guardians, the *zunft* of

Psychologists properly speaking. While they are engaged in cautious, painstaking effort to extend their own knowledge concerning her mysteries, interlopers and charlatans of all sorts are greedily capitalizing the credulity of an uniformed public, to the ultimate harm of both the public and the lady in question.

To show that she's not at all that kind of a gal is the *raison d'être* of the volume here under review. To give the author's own statement, "There is a lack of literature which attempts to present in a readable form the principles, methods, and results of scientific psychology as applied to problems of everyday life."

For those at all informed the author's thesis needs no more than its statement to be accepted. Book shops, magazine stands, popular lectures by "mentalists," all are more or less shamelessly vending under the name of Psychology various nostrums concocted at best under the animus of ignorant and misguided enthusiasm, at worst with cynical disregard for intellectual decency and with unscrupulous motives of gain. The method and techiques of science are caviar to the general, who as a rule prefer food of a different sort. Any effort such as the volume by Professor Ewer to cultivate a more discerning taste is wholly commendable. However much psychologists may differ as to details of method and interpretation—and that honest differences of opinion do exist no one will deny—there can be no disagreement on the general point of view espoused in this book, the point of view of any scientific discipline.

The book is divided into four parts. Part I gives a treatment of Aims, Principles, and Methods. After a brief survey of procedures and techniques as related to the aims of psychology a clarification of the concepts "subconscious," "unconscious," and "suggestion" are attempted. Part II deals with Education and Everyday Life—a sketch of what is ordinarily thought of as coming within the purview of educational psychology. Under Mind and Health, the general heading for Part III, the author treats those things which are probably most frequently associated with the term "psychology" for the layman—psychonalysis, psychotherapy in general, faith healing, etc. Part IV concerns itself with a survey of the methods and problems of psychology as applied to industry and commerce.

Probably any such popular introduction as this must be unsatisfactory from the standpoint of the special student. This would doubtless be true of sciences much better organized than psychology. A wise friend of the reviewer once defined all teaching as being a process of judicious lying. All of us who are engaged in the art necessarily have our individual notions as to what should be emphasized and what omitted. Since the book makes no pretense of being a compendium of all knowledge psychological, however, no strictures can properly be applied where the matter is still one of opinion among those qualified to judge, but only when questions of fact arise.

One rather serious lapse in this connection is the statement that the coefficient of correlation "in common use known as 'Pearson's coefficient of correlation is $\frac{6\text{sum}d^2}{n(n^2-1)}$." This formula is *not* in common use for serious correlation studies nor is it Pearson's formula.

A few other points on which psychologists might honestly differ may be briefly mentioned. (1) The history of the two terms "unconscious" and "subconscious" has not been such as to throw all the obloquy of representing a mythical potency rather than a scientific concept upon the former, as the author is inclined to do. The argument here reminds one of Mephistopheles' advise to the student in *Faust* to battle only with words.

"Denn eben wo Begriffe fehlen
Da stellt ein Wort zur rerhten Zeit sich ein."

(2) "Subconsciousness works *mechanically*. It acts with a regularity of cause and effect which is distinct from rational self-direction and inhibition." Query, aside from the question of fact: is a *science* of psychology possible on any other basis than mechanistic postulates? (3) To subsume under the general heading of "special intelligence tests" such a diversity of tests as associates tests and special achievement tests of all sorts (educational tests) tends only further to befog an already very cloudy issue—especially for the lay person. (4) The attempted distinction between individual and "social" suggestion might be questioned. (5) "What is needed [in regard to religious psychotherapy] is.....a more studied practice of superposing religious faith upon medical care." (6) There is a *non sequitur* in the argument for the hereditary mental similarity of siblings (r of .40 to .75, which means 10 to 30 per cent better than a sheer guess) particularly when the author advances this argument: "Especially in twins is the mental similarity conspicuous, and since it is not substantially greater in older than in younger twins it cannot be ascribed to education." The relative weight of heredity *vs.* environment is not demonstrated in such figures, or by such argument. (7) In view of the fact that "Freudian psychology" is deprecated so generously—and some of the psychoanalytic literature certainly warrants this—it would seem to have been only fair to have differentiated more carefuly between the pronouncements of Freud and those of some of his over-enthusiastic followers. "The recommendation of its [Freudian doctrine] extreme advocates that one should refrain altogether from interfering with the emotions" is certainly counter to what Freud explicitly states in his General Introduction to Psychoanalysis—which the author lists in his bibliography.

With all these strictures the present writer feels that the book has a legitimate place. The intelligent layman and the beginning student should find it of value. Part IV on Industry and Commerce is particularly well done, and the chapter on Social and Moral Factors faces some of the larger problems involved in human adjustments.

Purdue University HERMANN REMMERS

DONALD A. LAIRD, Ph. D. *Applied Psychology for Nurses* pp. xi+236. J. B. Lippincott Co., Philadelphia, 1923.

In this little volume the author has "selected from the vast literature of psychology those facts of most immediate aid to nurses in understanding the patient, themselves, and their fellowmen," as announced on the paper cover. I should say that he has done more than that; he has gone further into the preserves of biology than many psychologists would venture—a procedure quite commendable, I believe.

Written in popular, newspaper English, the book should commend

itself to those with the amount of preliminary training that the ordinary nurse has, as well as beginning students of psychology generally. The advanced student may be a bit irritated or even slightly scandalized at the irreverance manifested toward the household gods of psychology in some of the chapter and section headings—e.g., "Enter the Villain"; "A Practical Joke on a Sea-Anemone"; "The Moon and the Devil Blamed."

As already intimated the book is biological and behavioristic in viewpoint. It is divided into four parts. Part I attempts to orient the student with respect to the origin, scope, and applications of psychology, with particular reference to medicine and nursing; this is done in twenty-five pages. In Part II, the most technical part of the book, the author treats the biological aspects and foundations of behavior. Part III, entitled "Applications," is the *piece de resistance*: learning endicronology, temperaments, instincts, psychoanalysis, suggestion,—these, although not all called by their first names, indicate the rubrics under which the discussion may be classified. Part IV is given over to somewhat more general, sociological applications of psychology and psychiatry, with particular regard to the subject of mental hygiene.

The author states in the preface that he has "endeavored to avoid all controversial matter not borne out by fact," and has succeeded in the main. The chapter on The Temperaments in Nursing, however, offers opportunity for polemic to one controversially inclined. The ancient classification of the temperaments could well be improved from the modern point of view of abnormal psychology. To trace the inheritance of these various traits as unit characters (p. 126) seems to me more than questionable, the study of the Eugenics Record Office, which the author quotes, notwithstanding. Any mention of the glands of internal secretion upon behavior also opens up another debatable question. It is only fair to say, however, that the author treads rather lightly here.

These strictures are, after all, only minor and largely theoretical matters. There is sufficient warrant and need for a book of this sort to make it a valuable adjunct in the training of nurses. The portions of the book dealing with mental hygiene and the applications in general are well worthy the attention of the lay reader and beginning students generally. Unconventionally written as the book is, I am not prepared to state that this is a fault rather than a virtue.

Purdue University HERMANN REMMERS

MEAD, ARTHUR RAYMOND. *Learning and Teaching.* Lippencott Company, 1923. pp. XI and 277.

Learning and Teaching, as the title suggests, is a study in applied psychology. The author has endeavored to cause the student of education to apply the general laws of psychology to a great variety of class-room problems. He has consciously attempted to do something that will aid in removing the source of much criticism against present-day teaching of psychology and education in our modern teacher-training institutions. There is the persistent criticism, often very bitter, that instruction in psychology and education fails to carry over from the teacher-training institution to the actual teaching of boys and girls. It is this criticism that has prompted Professor Mead to offer the

teachers of this country a new book on the subject.

Professor Mead has devoted one half of his 277 pages to exercises and references. These exercises and references cover a wide range of topics. Among the topics considered are the following: The nature of human learning, the general and individual factors that influence learning, the transfer of learning, the measurement of mental functions, psychological conditions concerned with the elementary and secondary curricula, and the psychological condition involved in educational methods. These topics receive a minimum of discussion. In fact the discussion of the text frequently is too limited to give the student adequate knowledge of the principle under consideration. Such information, however, may be readily gathered by the student from the excellent lists of references appended to each topic. This approach to the subject is familiar to those acquainted with the Principles of Teaching by Professor Thorndike.. The merits and limitations of such an approach are apparent.

Professor Mead has done students of education a real service by collecting this extended list of varied exercises and by carefully selecting references bearing on each topic. The exercises show discrimination in their selection and arrangement, and with the proper use of the suggested references, should give satisfactory results.

LOOSMORE, W. CHARLES. *The Gain of Personality.* E. P. Dutton & Co. pp. 233. Price $2.50.

The Gain of Personality is a popular psychological statement of the practical values of personality. In the course of his discussion, the author has treated the nature, elements, and general development of personality. Each of the three major divisions is analyzed into its component parts. Under the general head of element of personality we find such sub-divisions as individuality, sincerity, courage, enthusiasm, sensibility, self-expression, humor, and repose.

The book offers clear evidence that the author is acquainted with books and men. He states his position clearly and with effectiveness. Throughout he directs the reader's attention to those elements in the life of the individual necessary for success. He points out wherein many people fail, and indicates the elements necessary to success.

In brief the mission of the book is not to discuss personality "theoretically or philosophically" but "practically and helpfully." A reading of the book should aid the individual in taking stock of his personal merits and limitations.

WELLS, GEORGE ROSS. *Youth and the Open Door.* E. P. Dutton, 1922. pp. 175. Price $2.00.

The book contains a series of lectures originally delivered to freshmen in college. The purpose of the author is to present to young students certain laws of mental life whereby they may realize the largest benefits possible from their four years in college. With this point in mind, the author has discussed instinct, habit, remembering, attention, interest, thinking, emotions, causes of failure, choice of vocation, and character and temperament. The discussion of these topics is non-technical

in character, and is designed to make effective certain laws of psychology. The author's psychology is modern and its application to the task in hand is clear and judicious.

The reader turns away from the book with the feeling that the effort of the author has been worthwhile. He has pointed out certain aids in the use of the mental powers that can not fail to benefit the student. It is certainly the type of book that should find its way into the hands of our youth who desire to make economc use of student days.

On the whole the book is well written and places its message before the reader in an effective manner.

In brief it is an effort to apply lessons of psychology to the very processes which make possible psychology.

HOKE, ROY EDWARD. *The Improvement of Speed and Accuracy in Typewriting.* The Johns Hopkins University Studies in Education, 1922. pp. 42. Price 75c.

Experimental studies in learning typewriting are not numerous. Book's well-known study concerned itself chiefly with the psychology of skill. He did not stress the improvement of speed, accuracy, or methods of teaching typewriting.

In his study, Dr. Hoke has selected five definite questions for investigation: First, an investigation of the frequency of the occurrence of letters and marks used in the English language; Second, an examination of the number and distribution of errors made in actual typewriting, and in so far as possible determine the causes of the errors; Third, a study of the relative abilities of the eight fingers and of the two hands; Fourth, the determination of the loads or burdens of work placed by the present system upon the fingers and hands; Fifth, an attempt to point out the consideration which must be admitted in an effort to arrange a keyboard on scientific principles.

The study closes with a suggested keyboard together with certain criticism of the proposed changes in the keyboard. There is appended a bibliography of twenty-six titles. As would be expected most of the titles discuss the more general problem of the acquisition of skill.

To the reviewer the study deserves careful consideration by those interested in teaching typewriting and who are anxious to produce a product with the highest skill and accuracy. It at least suggests a method of approach of investigating ways and means of improving skill in one of the most widely used skills of man.

HOKE, ELMER RHODES. *The Measurement of Achievement in Shorthand.* The Johns Hopkins University Studies in Education, 1922. pp. 118. Price $1.50.

In this monograph Professor Hoke gives an account of four scales that he has constructed for use in connection with teaching Gregg Shorthand. The author recognizes the fact that the use of shorthand is a complex process, involving mental and motor factors. In his analysis of the process, the author selects four important aspects for consideration. These important aspects are reading ability, quality of writing, speed of writing, and knowledge of the system. A separate scale has been constructed

for each of the four items. Samples of each scale are printed in the appendix of the monograph. Tentative norms for each have been determined. It is the authors belief, and no doubt with a great deal of justification, that such scales in the hands of teachers of shorthand will result in better methods of teaching and consequently better qualified users of shorthand.

Ohio University WILLIS L. GARD

NEW BOOKS AND PAMPHLETS RECEIVED*

Books and pamphlets for review should be sent to James P. Porter, Department of Psychology, Ohio University, Athens, Ohio.

BAUDOUIN, L. CHARLES. (translated by Fred Rothwell.) *The Birth of Psyche.* E. P. Dutton & Company, New York City. 211 pp.

BYRNE, LEE. *Latin Tests in Iowa High Schools.* University of Iowa, Iowa City, Iowa. 40 pp.

DICKSON, VIRGIL E. *Mental Tests and the Classroom Teacher.* World Book Company, Yonkers-on-Hudson, N. Y. 231 pp.

EWER, BERNARD C. *Applied Psychology,* Macmillan Company, New York. 480 pp.

FORBES, JOSEPH. *Lehrbuch der Experimentellen Psychologie.* Herder & Co. G. m. b. H. Verlagsbuchhandlung, Freiburg im Breisgau. 631 pp.

GATES, ARTHUR I. *Psychology for Students of Education.* The Macmillan Company, New York. 489 pp.

HALBERT, L. A. *What is Professional Social Work?* The Survey. 112 East 19th St., New York City. 149 pp.

HALL, G. STANLEY. *Life and Confessions of a Psychologist.* D. Appleton Company, New York. Price $5.00. 623 pp.

HENDERSON, C. A. *Personal and Business Efficiency.* George H. Doran Company, New York. Price $2.00. 308 pp.

MONSARRAT, K. W. *Health and the Human Spirit.* E. P. Dutton & Company, New York. Price $2.00. 132 pp.

PUBLICATIONS ISSUED BY THE DEPARTMENT OF INTERIOR, BUREAU OF EDUCATION, WASHINGTON, D. C.

Americanization in the United States. John J. Mahoney. Bulletin No. 31, 1923. 42 pp.

Analytic Survey of State Courses of Study for Rural Elementary Schools. Charles M. Reinoehl. Bulletin No. 42, 1922. 116 pp.

An Americanization Program. E. J. Irwin. Bulletin No. 30, 1923. 60 pp.

Art Educations: The Present Situation. Royal Bailey Farnum. Bulletin No. 13, 1923. 20 pp.

Athletic Badge Tests for Boys and Girls. Physical Education Series No. 2, 1923. Prepared by the Playground and Recreation Association of America. 17 pp.

Bible in the Public Schools. William R. Hood. Bulletin No. 15, 1923. 13 pp.

Child Health School. Conducted at the University of Chicago, 1920. Lydia J. Roberts. School Health Studies. No. 2, 1923. 60 pp.

College Entrance Credits in Commercial Subjects. Glen Levin Swiggett. Commercial Education Leaflet No. 4, April, 1923. 22 pp.

*Mention here does not preclude further comment.

Consolidation of Schools in Randolph County, Indiana. O. H. Greist. Rural School Leaflet No. 12, 1923. 11 pp.

Consolidation of Schools of Weld County, Colorado. C. G. Sargent. Rural School Leaflet No. 13, 1923. 11 pp.

Educational Extension. Charles G. Maphis. Bulletin No. 24, 1923. 32 pp.

Educational Hygiene. Willard S. Small. Bulletin No. 33, 1923. 36 pp.

Educational Progress and the Parents. Orville G. Brim Rural School Leaflet No. 15, May, 1923. 8 pp.

Educational Surveys. Edward Franklin Buchner. Bulletin No. 17, 1923. 44 pp.

Educational Work of The Knights of Columbus. Mark J. Sweany. Bulletin No. 22, 1923. 12 pp.

Educational Work of the Young Women's Christian Association. By Education and Research Division, National Board of Y. W. C. A. Bulletin No. 26, 1923. 24 pp.

Enrollment in Foreign Languages, Science and Commercial Subjects in Public High Schools. Florence DuBois. Statistical Circular No. 2, May, 1923. 9 pp.

Federal Aid to Public Schools. Fletcher Harper Swift. Bulletin No. 47, 1922. 47 pp.

Hampton Normal and Agricultural Institute. Walton C. John. Bulletin No. 27, 1923. 116 pp.

Higher Education, 1920-1922. George F. Zook. Bulletin No. 34, 1923. 33 pp.

History of the Manual Training School of Washington University. (St. Louis Training School.) Charles Penney Coates. Bulletin No. 3, 1923. 86 pp.

Home Economics Education. Henrietta W. Calvin. Bulletin No. 6, 1923. 19 pp.

Iowa Plan of Training Superintendents and Teachers for Consolidated Schools. Macy Campbell. Rural School Leaflet No. 17, June, 1923.

Junior High Schools of Berkeley, California. James T. Preston and others. Bulletin No. 4, 1923. 48 pp.

Main Streets of the Nation. A Series of Projects on Highway Transport for Elementary Schools. Florence C. Fox. Bulletin No. 38, 1923. 42 pp.

Medical Education, 1920-1922. N. P. Colwell, M. C. Bulletin No. 18, 1923. 17 pp.

Objectives in Elementary Rural School Agriculture. E. E. Windes. Rural School Leaflet No. 11, March, 1923. 18 pp.

Organization and Conduct of Business. Glen Levin Swiggett. Commercial Education Leaflet No. 5, June, 1923. 18 pp.

Principles of Kindergarten-Primary Education in the Consolidated Rural School. Katherine M. Cook. Rural School Leaflet No. 18, June, 1923. 9 pp.

Progressive Tendencies in European Education. C. W. Washburne. Bulletin No. 37, 1923. 31 pp.

Public Education in Oklahoma. Bulletin No. 14, 1923. 92 pp.

Public School System of Arkansas. Bulletin No. 11, 1923. 110 pp.

Recent Advances in Instruction in Music. Will Earhart and Charles N. Boyd. Bulletin No. 30, 1923. 21 pp.

Recent Developments in Educational Journalism. W. Carson Ryan, Jr. Bulletin No. 25, 1923. 14 pp.

Record of Current Educational Publications. Bulletin No. 32, 1923. 36 pp.

References on Education of Women in the United States. Library Leaflet No. 19, April, 1923. 7 pp.

References on Preschool and Kindergarten-Primary Education. Nina C. Vandewalker and Harriet E. Howard. Kindergarten Circular No. 14, July, 1923. Price per copy 5 cents. 11 pp.

Rural-Teacher Situation in the United States. Mabel Carney. Rural School Leaflet No. 14, May, 1923. Price per copy 5 cents. 12 pp.

School Building Program for Washington, North Carolina. Alice Barrows. Bulletin No. 2, 1923. 20 pp.

School Support and School Indebtedness in Cities. Florence DuBois. Statistical Circular No. 3, June, 1923. 5 pp.

Social Studies in Civic Education. Edgar Dawson. Bulletin No. 23, 1923. 16 pp.

Some Industrial Art Schools of Europe. Marius Vachon. Translation by Florence N. Levy. Bulletin No. 48, 1922. 59 pp.

State Policies in Public School Finance. Fletcher Harper Swift. Bulletin No. 6, 1922. 54 pp.

Statistical Survey of Education, 1919-1920. Florence DuBois. Bulletin No. 16, 1923. 41 pp.

Statistics of City School Systems, 1919-1920. H. R. Bonner. Bulletin No. 17, 1922. 173 pp.

Statistics Relating to Business Education in Colleges and Universities, 1921-1922. Glen Levin Swiggett. Commercial Education Leaflet No. 6, June, 1923. 8 pp.

Supervision of One-Teacher Schools. Maud C. Newbury. Bulletin No. 9, 1923. 55 pp.

Vocational Education. William T. Bawden. Bulletin No. 28, 1923. 26 pp.

ROBINSON, GEORGE EDWIN. *Scientific Salesmanship.* Three Volumes. American College of Scientific Salesmanship, Chicago, Ill.

SKAGGS, ERNEST BURTON. *Elementary Text Book of Mental Measurements.* George Wahr, Publisher, Ann Arbor, Mich. 169 pp.

STARCH, DANIEL. *Principles of Advertising.* A. W. Shaw Company, New York. 998 pp.

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